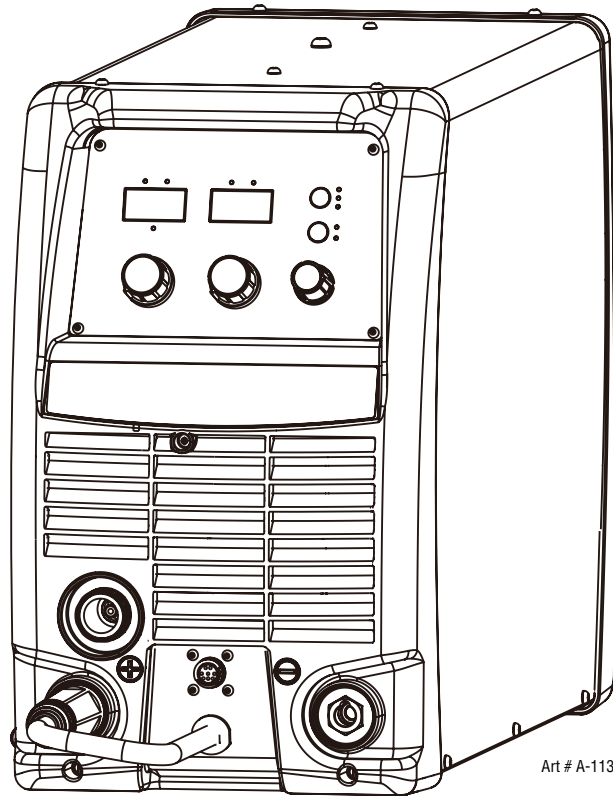




# 211i

## FABRICATOR® 3 IN 1 MULTI-PROCESS WELDING SYSTEM



Art # A-11350

# Service Manual



Revision: AB  
Operating Features:

Issue Date: March 1, 2013

Manual No.: 0-5158

INVERTER	GMW FCAW	GTAW	SMAW	CC CV	210 AMP	DC	115 V	208 V	230 V	1 PHASE
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## **WE APPRECIATE YOUR BUSINESS!**

Congratulations on your new Thermal Arc product. We are proud to have you as our customer and will strive to provide you with the best service and reliability in the industry. This product is backed by our extensive warranty and world-wide service network. To locate your nearest distributor or service agency call 1-800-462-2782 (USA) and 1-905-827-4515 (Canada), or visit us on the web at **[www.Thermalarc.com](http://www.Thermalarc.com)**

This Service Manual has been designed to instruct you on the correct use and operation of your Thermal Arc product. Your satisfaction with this product and its safe operation is our ultimate concern. Therefore please take the time to read the entire manual, especially the Safety Precautions. They will help you to avoid potential hazards that may exist when working with this product.

We have made every effort to provide you with accurate instructions, drawings, and photographs of the product(s) while writing this manual. However errors do occur and we apologize if there are any contained in this manual.

Due to our constant effort to bring you the best products, we may make an improvement that does not get reflected in the manual. If you are ever in doubt about what you see or read in this manual with the product you received, then check for a newer version of the manual on our website or contact our customer support for assistance.

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Above all, we are committed to develop technologically advanced products to achieve a safer working environment within the welding industry.



## **WARNINGS**

*Read and understand this entire Manual and your employer's safety practices before installing, operating, or servicing the equipment.*

*While the information contained in this Manual represents the Manufacturer's best judgment, the Manufacturer assumes no liability for its use.*

Service Manual Number 0-5158 for:

Thermal Arc Fabricator 211i Portable System Package

Part Number W1004201

Thermal Arc Fabricator 211i Portable System with Cart

Part Number W1004202

Thermal Arc Fabricator 211i Power Source

Part Number W1004200

Thermal Arc Fabricator 211i Package w/Single Cylinder Cart

Part Number W1004203

Published by:

Victor Technologies International Inc.

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[www.victortechnologies.com](http://www.victortechnologies.com)

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Publication Date: January 31, 2013

Revision Date: March 1, 2013

### **Record the following information for Warranty purposes:**

Where Purchased: \_\_\_\_\_

Purchase Date: \_\_\_\_\_

Equipment Serial #: \_\_\_\_\_

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## SECTION 1: SAFETY INSTRUCTIONS AND WARNINGS



### WARNING

**PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS KEEP AWAY UNTIL CONSULTING YOUR DOCTOR. DO NOT LOSE THESE INSTRUCTIONS. READ OPERATING/INSTRUCTION MANUAL BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.**

Welding products and welding processes can cause serious injury or death, or damage to other equipment or property, if the operator does not strictly observe all safety rules and take precautionary actions.

Safe practices have developed from past experience in the use of welding and cutting. These practices must be learned through study and training before using this equipment. Some of these practices apply to equipment connected to power lines; other practices apply to engine driven equipment. Anyone not having extensive training in welding and cutting practices should not attempt to weld.

Safe practices are outlined in the American National Standard Z49.1 entitled: SAFETY IN WELDING AND CUTTING. This publication and other guides to what you should learn before operating this equipment are listed at the end of these safety precautions. **HAVE ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR WORK PERFORMED ONLY BY QUALIFIED PEOPLE.**

### 1.01 Arc Welding Hazards



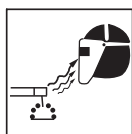
### WARNING

#### ***ELECTRIC SHOCK can kill.***

*Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semi-automatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.*

1. Do not touch live electrical parts.
2. Wear dry, hole-free insulating gloves and body protection.
3. Insulate yourself from work and ground using dry insulating mats or covers.
4. Disconnect input power or stop engine before installing or servicing this equipment. Lock input power disconnect switch open, or remove line fuses so power cannot be turned on accidentally.
5. Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
6. Turn OFF all equipment when not in use. Disconnect power to equipment if it will be left unattended or out of service.
7. Use fully insulated electrode holders. Never dip holder in water to cool it or lay it down on the ground or the work surface. Do not touch holders connected to two welding machines at the same time or touch other people with the holder or electrode.
8. Do not use worn, damaged, undersized, or poorly spliced cables.
9. Do not wrap cables around your body.
10. Ground the workpiece to a good electrical (earth) ground.
11. Do not touch electrode while in contact with the work (ground) circuit.
12. Use only well-maintained equipment. Repair or replace damaged parts at once.
13. In confined spaces or damp locations, do not use a welder with AC output unless it is equipped with a voltage reducer. Use equipment with DC output.
14. Wear a safety harness to prevent falling if working above floor level.

15. Keep all panels and covers securely in place.


**WARNING**

*ARC RAYS can burn eyes and skin; NOISE can damage hearing. Arc rays from the welding process produce intense heat and strong ultraviolet rays that can burn eyes and skin. Noise from some processes can damage hearing.*

1. Wear a welding helmet fitted with a proper shade of filter (see ANSI Z49.1 listed in Safety Standards) to protect your face and eyes when welding or watching.
2. Wear approved safety glasses. Side shields recommended.

3. Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
4. Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.
5. Use approved ear plugs or ear muffs if noise level is high.


**WARNING**

*FUMES AND GASES can be hazardous to your health.*

*Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.*

AWS F2.2:2001 (R2010), Adapted with permission of the American Welding Society (AWS), Miami, Florida

**Guide for Shade Numbers**

Process	Electrode Size in. (mm)	Arc Current (Amperes)	Minimum Protective Shade	Suggested* Shade No. (Comfort)
Shielded Metal Arc Welding (SMAW)	Less than 3/32 (2.4)	Less than 60	7	-
	3/32-5/32 (2.4-4.0)	60-160	8	10
	5/32-1/4 (4.0-6.4)	160-250	10	12
	More than 1/4 (6.4)	250-550	11	14
Gas Metal Arc Welding (GMAW) and Flux Cored Arc Welding (FCAW)		Less than 60	7	-
		60-160	10	11
		160-250	10	12
		250-550	10	14
Gas Tungsten arc Welding (GTAW)		Less than 50	8	10
		50-150	8	12
		150-500	10	14
Air Carbon Arc Cutting (CAC-A)	(Light)	Less than 500	10	12
	(Heavy)	500-1000	11	14
Plasma Arc Welding (PAW)		Less than 20	6	6 to 8
		20-100	8	10
		100-400	10	12
		400-800	11	14
Plasma Arc Cutting (PAC)		Less than 20	4	4
		20-40	5	5
		40-60	6	6
		60-80	8	8
		80-300	8	9
		300-400	9	12
		400-800	10	14

\* As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade which gives sufficient view of the weld zone without going below the minimum. In oxyfuel gas welding, cutting, or brazing where the torch and/or the flux produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line of the visible light spectrum.

1. Keep your head out of the fumes. Do not breathe the fumes.
2. If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
3. If ventilation is poor, use an approved air-supplied respirator.
4. Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals, consumables, coatings, and cleaners.
5. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Shielding gases used for welding can displace air causing injury or death. Be sure the breathing air is safe.
6. Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
7. Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



## WARNING

*WELDING can cause fire or explosion. Sparks and spatter fly off from the welding arc. The flying sparks and hot metal, weld spatter, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode or welding wire to metal objects can cause sparks, overheating, or fire.*

1. Protect yourself and others from flying sparks and hot metal.
2. Do not weld where flying sparks can strike flammable material.
3. Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
4. Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
5. Watch for fire, and keep a fire extinguisher nearby.

6. Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
7. Do not weld on closed containers such as tanks or drums.
8. Connect work cable to the work as close to the welding area as practical to prevent welding current from travelling long, possibly unknown paths and causing electric shock and fire hazards.
9. Do not use welder to thaw frozen pipes.
10. Remove stick electrode from holder or cut off welding wire at contact tip when not in use.



## WARNING

*FLYING SPARKS AND HOT METAL can cause injury.*

*Chipping and grinding cause flying metal. As welds cool, they can throw off slag.*

1. Wear approved face shield or safety goggles. Side shields recommended.
2. Wear proper body protection to protect skin.



## WARNING

*CYLINDERS can explode if damaged.*

*Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.*

1. Protect compressed gas cylinders from excessive heat, mechanical shocks, and arcs.
2. Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.
3. Keep cylinders away from any welding or other electrical circuits.
4. Never allow a welding electrode to touch any cylinder.
5. Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.

6. Turn face away from valve outlet when opening cylinder valve.
7. Keep protective cap in place over valve except when cylinder is in use or connected for use.
8. Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

**WARNING**

*Engines can be dangerous.*

**WARNING**

*ENGINE EXHAUST GASES can kill.*

Engines produce harmful exhaust gases.

1. Use equipment outside in open, well-ventilated areas.
2. If used in a closed area, vent engine exhaust outside and away from any building air intakes.

**WARNING**

*ENGINE FUEL can cause fire or explosion.*

*Engine fuel is highly flammable.*

1. Stop engine before checking or adding fuel.
2. Do not add fuel while smoking or if unit is near any sparks or open flames.
3. Allow engine to cool before fuelling. If possible, check and add fuel to cold engine before beginning job.
4. Do not overfill tank — allow room for fuel to expand.
5. Do not spill fuel. If fuel is spilled, clean up before starting engine.

**WARNING**

*MOVING PARTS can cause injury.*

Moving parts, such as fans, rotors, and belts can cut fingers and hands and catch loose clothing.

1. Keep all doors, panels, covers, and guards closed and securely in place.
2. Stop engine before installing or connecting unit.
3. Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
4. To prevent accidental starting during servicing, disconnect negative (-) battery cable from battery.
5. Keep hands, hair, loose clothing, and tools away from moving parts.
6. Reinstall panels or guards and close doors when servicing is finished and before starting engine.

**WARNING**

*SPARKS can cause BATTERY GASES TO EXPLODE; BATTERY ACID can burn eyes and skin.*

Batteries contain acid and generate explosive gases.

1. Always wear a face shield when working on a battery.
2. Stop engine before disconnecting or connecting battery cables.
3. Do not allow tools to cause sparks when working on a battery.
4. Do not use welder to charge batteries or jump start vehicles.
5. Observe correct polarity (+ and –) on batteries.

**WARNING**

*STEAM AND PRESSURIZED HOT COOLANT can burn face, eyes, and skin.*

*The coolant in the radiator can be very hot and under pressure.*

1. Do not remove radiator cap when engine is hot. Allow engine to cool.
2. Wear gloves and put a rag over cap area when removing cap.
3. Allow pressure to escape before completely removing cap.

## NOTE

*Considerations About Welding And The Effects of Low Frequency Electric and Magnetic Fields*

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, Biological Effects of Power Frequency Electric & Magnetic Fields - Background Paper, OTA-BP-E-63 (Washington, DC: U.S. Government Printing Office, May 1989): "...there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks."

To reduce magnetic fields in the workplace, use the following procedures.

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cable around the body.
4. Keep welding Power Source and cables as far away from body as practical.

**ABOUT PACEMAKERS:**

*The above procedures are among those also normally recommended for pacemaker wearers. Consult your doctor for complete information.*

**1.02 General Safety Information For Victor CS Regulator****A Fire Prevention**

Welding and cutting operations use fire or combustion as a basic tool. The process is very useful when properly controlled. However, it can be extremely destructive if not performed correctly in the proper environment.

1. The work area must have a fireproof floor.
2. Work benches or tables used during welding or cutting operations must have fireproof tops.
3. Use heat resistant shields or other approved material to protect nearby walls or unprotected flooring from sparks and hot metal.
4. Keep an approved fire extinguisher of the proper size and type in the work area. Inspect it regularly to ensure that it is in proper working order. Know how to use the fire extinguisher.
5. Move combustible materials away from the work site. If you can not move them, protect them with fireproof covers.

**WARNING**

*NEVER perform welding, heating, or cutting operations on a container that has held toxic, combustible or flammable liquids, or vapors. NEVER perform welding, heating, or cutting operations in an area containing combustible vapors, flammable liquids, or explosive dust.*

**B Housekeeping****WARNING**

*NEVER allow oxygen to contact grease, oil, or other flammable substances. Although oxygen by itself will not burn, these substances become highly explosive. They can ignite and burn violently in the presence of oxygen.*

Keep ALL apparatus clean and free of grease, oil and other flammable substances.



**C Ventilation****WARNING**

*Adequately ventilate welding, heating, and cutting work areas to prevent accumulation of explosive or toxic concentrations of gases. Certain combinations of metals, coatings, and gases generate toxic fumes. Use respiratory protection equipment in these circumstances. When welding/brazing, read and understand the Material Safety Data Sheet for the welding/brazing alloy.*

**D Personal Protection**

Gas flames produce infrared radiation which may have a harmful effect on the skin and especially on the eyes. Select goggles or a mask with tempered lenses, shaded 4 or darker, to protect your eyes from injury and provide good visibility of the work.

Always wear protective gloves and flame-resistant clothing to protect skin and clothing from sparks and slag. Keep collars, sleeves, and pockets buttoned. **DO NOT** roll up sleeves or cuff pants.

When working in a non-welding or cutting environment, always wear suitable eye protection or face shield.

**WARNING**

*Practice the following safety and operation precautions EVERY TIME you use pressure regulation equipment. Deviation from the following safety and operation instructions can result in fire, explosion, damage to equipment, or injury to the operator.*

**E Compressed Gas Cylinders**

The Department of Transportation (DOT) approves the design and manufacture of cylinders that contain gases used for welding or cutting operations.

1. Place the cylinder (Figure 1-1) where you will use it. Keep the cylinder in a vertical position. Secure it to a cart, wall, work bench, post, etc.

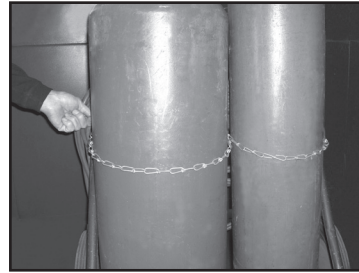


Figure 1-1: Gas Cylinders

**WARNING**

*Cylinders are highly pressurized. Handle with care. Serious accidents can result from improper handling or misuse of compressed gas cylinders **DO NOT** drop the cylinder, knock it over, or expose it to excessive heat, flames or sparks. **DO NOT** strike it against other cylinders. Contact your gas supplier or refer to CGA P-1 "Safe Handling of Compressed Gases in Containers" publication.*

**NOTE**

*CGA P-1 publication is available by writing the Compressed Gas Association, 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923*

2. Place the valve protection cap on the cylinder whenever moving it, placing it in storage, or not using it. Never drag or roll cylinders in any way. Use a suitable hand truck to move cylinders.
3. Store empty cylinders away from full cylinders. Mark them "EMPTY" and close the cylinder valve.
4. **NEVER** use compressed gas cylinders without a pressure reducing regulator attached to the cylinder valve.
5. Inspect the cylinder valve for oil, grease, and damaged parts.



**WARNING**

*DO NOT use the cylinder if you find oil, grease or damaged parts. Inform your gas supplier of this condition immediately.*

6. Momentarily open and close (called “cracking”) the cylinder valve to dislodge any dust or dirt that may be present in the valve.

**CAUTION**

*Open the cylinder valve slightly. If you open the valve too much, the cylinder could tip over. When cracking the cylinder valve, DO NOT stand directly in front of the cylinder valve. Always perform cracking in a well ventilated area. If an acetylene cylinder sprays a mist when cracked, let it stand for 15 minutes. Then, try to crack the cylinder valve again. If this problem persists, contact your gas supplier.*

### 1.03 Principal Safety Standards

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126.

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126.

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices for Occupation and Educational Eye and Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

## 1.04 Symbol Chart

Note that only some of these symbols will appear on your model.

	On		Single Phase		Wire Feed Function
	Off		Three Phase		Wire Feed Towards Workpiece With Output Voltage Off.
	Dangerous Voltage		Three Phase Static Frequency Converter-Transformer-Rectifier		Welding Gun
	Increase/Decrease		Remote		Purging Of Gas
	Circuit Breaker		Duty Cycle		Continuous Weld Mode
	AC Auxiliary Power		Percentage		Spot Weld Mode
	Fuse		Panel/Local		Spot Time
	Amperage		Shielded Metal Arc Welding (SMAW)		Preflow Time
	Voltage		Gas Metal Arc Welding (GMAW)		Postflow Time
	Hertz (cycles/sec)		Gas Tungsten Arc Welding (GTAW)	<b>2 Step Trigger Operation</b> Press to initiate wirefeed and welding, release to stop.	
	Frequency		Air Carbon Arc Cutting (CAC-A)	<b>4 Step Trigger Operation</b> Press and hold for preflow, release to start arc. Press to stop arc, and hold for preflow.	
	Negative		Constant Current		Burnback Time
	Positive		Constant Voltage Or Constant Potential		Inches Per Minute
	Direct Current (DC)		High Temperature		Meters Per Minute
	Protective Earth (Ground)		Fault Indication		See Note
	Line		Arc Force		See Note
	Line Connection		Touch Start (GTAW)	Cannot be disposed with household garbage.	
	Auxiliary Power		Variable Inductance		
	Receptacle Rating-Auxiliary Power		Voltage Input	Art # A-04130_AB	

Note: For environments with increased hazard of electrical shock, Power Supplier bearing the mark conform to EN50192 when used in conjunction with hand torches with exposed tips, if equipped with properly installed standoff guides.



Cannot be disposed with household garbage.

## 1.05 Precautions De Securite En Soudage A L'arc



MISE EN GARDE

### LE SOUDAGE A L'ARC EST DANGEREUX

**PROTEGEZ-VOUS, AINSI QUE LES AUTRES, CONTRE LES BLESSURES GRAVES POSSIBLES OU LA MORT. NE LAISSEZ PAS LES ENFANTS S'APPROCHER, NI LES PORTEURS DE STIMULATEUR CARDIAQUE (A MOINS QU'ILS N'AIENT CONSULTE UN MEDECIN). CONSERVEZ CES INSTRUCTIONS. LISEZ LE MANUEL D'OPERATION OU LES INSTRUCTIONS AVANT D'INSTALLER, UTILISER OU ENTREtenir CET EQUIPEMENT.**

Les produits et procédés de soudage peuvent sauser des blessures graves ou la mort, de même que des dommages au reste du matériel et à la propriété, si l'utilisateur n'adhère pas strictement à toutes les règles de sécurité et ne prend pas les précautions nécessaires.

En soudage et coupage, des pratiques sécuritaires se sont développées suite à l'expérience passée. Ces pratiques doivent être apprises par étude ou entraînement avant d'utiliser l'équipement. Toute personne n'ayant pas suivi un entraînement intensif en soudage et coupage ne devrait pas tenter de souder. Certaines pratiques concernent les équipements raccordés aux lignes d'alimentation alors que d'autres s'adressent aux groupes électrogènes.

La norme Z49.1 de l'American National Standard, intitulée "SAFETY IN WELDING AND CUTTING" présente les pratiques sécuritaires à suivre. Ce document ainsi que d'autres guides que vous devriez connaître avant d'utiliser cet équipement sont présentés à la fin de ces instructions de sécurité.

SEULES DES PERSONNES QUALIFIEES DOIVENT FAIRE DES TRAVAUX D'INSTALLATION, DE REPARATION, D'ENTRETIEN ET D'ESSAI.

## 1.06 Dangers relatifs au soudage à l'arc



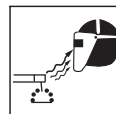
AVERTISSEMENT

### **L'ELECTROCUTION PEUT ETRE MORTELLE.**

*Une décharge électrique peut tuer ou brûler gravement. L'électrode et le circuit de soudage sont sous tension dès la mise en circuit. Le circuit d'alimentation et les circuits internes de l'équipement sont aussi sous tension dès la mise en marche. En soudage automatique ou semi-automatique avec fil, ce dernier, le rouleau ou la bobine de fil, le logement des galets d'entraînement et toutes les pièces métalliques en contact avec le fil de soudage sont sous tension. Un équipement inadéquatement installé ou inadéquatement mis à la terre est dangereux.*

1. Ne touchez pas à des pièces sous tension.
2. Portez des gants et des vêtements isolants, secs et non troués.
3. Isolez-vous de la pièce à souder et de la mise à la terre au moyen de tapis isolants ou autres.
4. Déconnectez la prise d'alimentation de l'équipement ou arrêtez le moteur avant de l'installer ou d'en faire l'entretien. Bloquez le commutateur en circuit ouvert ou enlevez les fusibles de l'alimentation afin d'éviter une mise en marche accidentelle.
5. Veuillez à installer cet équipement et à le mettre à la terre selon le manuel d'utilisation et les codes nationaux, provinciaux et locaux applicables.
6. Arrêtez tout équipement après usage. Coupez l'alimentation de l'équipement s'il est hors d'usage ou inutilisé.
7. N'utilisez que des porte-électrodes bien isolés. Ne jamais plonger les porte-électrodes dans l'eau pour les refroidir. Ne jamais les laisser traîner par terre ou sur les pièces à souder. Ne touchez pas aux porte-électrodes raccordés à deux sources de courant en même temps. Ne jamais toucher quelqu'un d'autre avec l'électrode ou le porte-électrode.
8. N'utilisez pas de câbles électriques usés, endommagés, mal épissés ou de section trop petite.
9. N'enroulez pas de câbles électriques autour de votre corps.

10. N'utilisez qu'une bonne prise de masse pour la mise à la terre de la pièce à souder.
11. Ne touchez pas à l'électrode lorsqu'en contact avec le circuit de soudage (terre).
12. N'utilisez que des équipements en bon état. Réparez ou remplacez aussitôt les pièces endommagées.
13. Dans des espaces confinés ou mouillés, n'utilisez pas de source de courant alternatif, à moins qu'il soit muni d'un réducteur de tension. Utilisez plutôt une source de courant continu.
14. Portez un harnais de sécurité si vous travaillez en hauteur.
15. Fermez solidement tous les panneaux et les capots.


**AVERTISSEMENT**

**LE RAYONNEMENT DE L'ARC PEUT BRÛLER LES YEUX ET LA PEAU; LE BRUIT PEUT ENDOMMAGER L'OUIE.**

*L'arc de soudage produit une chaleur et des rayons ultraviolets intenses, susceptibles de brûler les yeux et la peau. Le bruit causé par certains procédés peut endommager l'ouïe.*

1. Portez une casque de soudeur avec filtre oculaire de nuance appropriée (consultez la norme ANSI Z49 indiquée ci-après) pour vous protéger le visage et les yeux lorsque vous soudez ou que vous observez l'exécution d'une soudure.

AWS F2.2 : 2001 (R2010), Modifié avec l'accord de l'American Welding Society (AWS), Miami, Florida

Guide de teinte des lentilles				
Procédé	Taille de l'électrode en mm (po)	Courant d'arc (ampères)	Gamme d'intensité minimum	Numéro de teinte recommandée* (Confort)
Soudage à l'arc avec électrode enrobée (procédé SMAW)	Moins de 2,4 (3/32) 3/32-5/32 (2,4-4,0) 5/32-1/4 (4,0-6,4) Plus de 1/4 (6,4)	Moins de 60 60-160 160-250 250-550	7 8 10 11	- 10 12 14
Soudage à l'arc sous gaz avec fil plein (procédé GMAW) et soudage avec fil fourré (procédé FCAW)		Moins de 60 60-160 160-250 250-550	7 10 10 10	- 11 12 14
Soudage à l'électrode réfractaire (procédé GTAW)		Moins de 50 50-150 150-500	8 8 10	10 12 14
Coupage à l'arc avec électrode de carbone et jet d'air (procédé AAC)	(Clair) (Sombre)	Moins de 500 500-1000	10 11	12 14
Soudage à l'arc au plasma (procédé PAW)		Moins de 20 20-100 100-400 400-800	6 8 10 11	6 à 8 10 12 14
Coupage plasma (procédé PAC)		Moins de 20 20-40 40-60 60-80 80-300 300-400 400-800	4 5 6 8 8 9 10	4 5 6 8 9 12 14

\* En règle générale, commencer avec une teinte plus foncée pour voir la zone de soudage. Réduire ensuite progressivement vers la teinte qui permet de voir la zone de soudage sans dépasser le minimum. Lors du soudage, du coupage ou du brasage au gaz oxygéné, la torche ou le fondant produit une puissante lumière jaune; il est préférable d'utiliser un filtre qui absorbe cette lumière jaune ou le sodium du spectre de la lumière visible.

Tableau 1-1

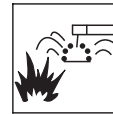
2. Portez des lunettes de sécurité approuvées. Des écrans latéraux sont recommandés.
3. Entourez l'aire de soudage de rideaux ou de cloisons pour protéger les autres des coups d'arc ou de l'éblouissement; avertissez les observateurs de ne pas regarder l'arc.
4. Portez des vêtements en matériaux ignifuges et durables (laine et cuir) et des chaussures de sécurité.
5. Portez un casque antibruit ou des bouchons d'oreille approuvés lorsque le niveau de bruit est élevé.

**AVERTISSEMENT**

***LES VAPEURS ET LES FUMÉES SONT DANGEREUSES POUR LA SANTÉ.***

***Le soudage dégage des vapeurs et des fumées dangereuses à respirer.***

1. Eloignez la tête des fumées pour éviter de les respirer.
2. A l'intérieur, assurez-vous que l'aire de soudage est bien ventilée ou que les fumées et les vapeurs sont aspirées à l'arc.
3. Si la ventilation est inadéquate, portez un respirateur à adduction d'air approuvé.
4. Lisez les fiches signalétiques et les consignes du fabricant relatives aux métaux, aux produits consommables, aux revêtements et aux produits nettoyants.
5. Ne travaillez dans un espace confiné que s'il est bien ventilé; sinon, portez un respirateur à adduction d'air. Les gaz protecteurs de soudage peuvent déplacer l'oxygène de l'air et ainsi causer des malaises ou la mort. Assurez-vous que l'air est propre à la respiration.
6. Ne soudez pas à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir avec des vapeurs et former des gaz hautement toxiques et irritants.
7. Ne soudez des tôles galvanisées ou plaquées au plomb ou au cadmium que si les zones à souder ont été grattées à fond, que si l'espace est bien ventilé; si nécessaire portez un respirateur à adduction d'air. Car ces revêtements et tout métal qui contient ces éléments peuvent dégager des fumées toxiques au moment du soudage.

**AVERTISSEMENT**

***LE SOUDAGE PEUT CAUSER UN INCENDIE OU UNE EXPLOSION***

***L'arc produit des étincelles et des projections. Les particules volantes, le métal chaud, les projections de soudure et l'équipement surchauffé peuvent causer un incendie et des brûlures. Le contact accidentel de l'électrode ou du fil-électrode avec un objet métallique peut provoquer des étincelles, un échauffement ou un incendie.***

1. Protégez-vous, ainsi que les autres, contre les étincelles et du métal chaud.
2. Ne soudez pas dans un endroit où des particules volantes ou des projections peuvent atteindre des matériaux inflammables.
3. Enlevez toutes matières inflammables dans un rayon de 10, 7 mètres autour de l'arc, ou couvrez-les soigneusement avec des bâches approuvées.
4. Méfiez-vous des projections brûlantes de soudage susceptibles de pénétrer dans des aires adjacentes par de petites ouvertures ou fissures.
5. Méfiez-vous des incendies et gardez un extincteur à portée de la main.
6. N'oubliez pas qu'une soudure réalisée sur un plafond, un plancher, une cloison ou une paroi peut enflammer l'autre côté.
7. Ne soudez pas un récipient fermé, tel un réservoir ou un baril.
8. Connectez le câble de soudage le plus près possible de la zone de soudage pour empêcher le courant de suivre un long parcours inconnu, et prévenir ainsi les risques d'électrocution et d'incendie.
9. Ne dégelez pas les tuyaux avec un source de courant.
10. Otez l'électrode du porte-électrode ou coupez le fil au tube-contact lorsqu'inutilisé après le soudage.
11. Portez des vêtements protecteurs non huileux, tels des gants en cuir, une chemise épaisse, un pantalon revers, des bottines de sécurité et un casque.

**AVERTISSEMENT**

**LES ETINGELLES ET LES PROJECTIONS BRULANTES PEUVENT CAUSER DES BLESSURES.**

*Le piquage et le meulage produisent des particules métalliques volantes. En refroidissant, la soudure peut projeter du éclats de laitier.*

1. Portez un écran facial ou des lunettes protectrices approuvées. Des écrans latéraux sont recommandés.
2. Portez des vêtements appropriés pour protéger la peau.

**AVERTISSEMENT**

**LES BOUTEILLES ENDOMMAGEES PEUVENT EXPLOSER**

*Les bouteilles contiennent des gaz protecteurs sous haute pression. Des bouteilles endommagées peuvent exploser. Comme les bouteilles font normalement partie du procédé de soudage, traitez-les avec soin.*

1. Protégez les bouteilles de gaz comprimé contre les sources de chaleur intense, les chocs et les arcs de soudage.
2. Enchaînez verticalement les bouteilles à un support ou à un cadre fixe pour les empêcher de tomber ou d'être renversées.
3. Eloignez les bouteilles de tout circuit électrique ou de tout soudage.
4. Empêchez tout contact entre une bouteille et une électrode de soudage.
5. N'utilisez que des bouteilles de gaz protecteur, des détendeurs, des boyaux et des raccords conçus pour chaque application spécifique; ces équipements et les pièces connexes doivent être maintenus en bon état.
6. Ne placez pas le visage face à l'ouverture du robinet de la bouteille lors de son ouverture.

7. Laissez en place le chapeau de bouteille sauf si en utilisation ou lorsque raccordé pour utilisation.
8. Lisez et respectez les consignes relatives aux bouteilles de gaz comprimé et aux équipements connexes, ainsi que la publication P-1 de la CGA, identifiée dans la liste de documents ci-dessous.

**AVERTISSEMENT**

**LES MOTEURS PEUVENT ETRE DANGEREUX**

**LES GAZ D'ECHAPPEMENT DES MOTEURS PEUVENT ETRE MORTELS.**

Les moteurs produisent des gaz d'échappement nocifs.

1. Utilisez l'équipement à l'extérieur dans des aires ouvertes et bien ventilées.
2. Si vous utilisez ces équipements dans un endroit confiné, les fumées d'échappement doivent être envoyées à l'extérieur, loin des prises d'air du bâtiment.

**AVERTISSEMENT**

**LE CARBURANT PEUT CAUSER UN INCENDIE OU UNE EXPLOSION.**

*Le carburant est hautement inflammable.*

1. Arrêtez le moteur avant de vérifier le niveau de carburant ou de faire le plein.
2. Ne faites pas le plein en fumant ou proche d'une source d'étincelles ou d'une flamme nue.
3. Si c'est possible, laissez le moteur refroidir avant de faire le plein de carburant ou d'en vérifier le niveau au début du soudage.
4. Ne faites pas le plein de carburant à ras bord: prévoyez de l'espace pour son expansion.
5. Faites attention de ne pas renverser de carburant. Nettoyez tout carburant renversé avant de faire démarrer le moteur.



**AVERTISSEMENT**

**DES PIÈCES EN MOUVEMENT PEUVENT CAUSER DES BLESSURES.**

*Des pièces en mouvement, tels des ventilateurs, des rotors et des courroies peuvent couper doigts et mains, ou accrocher des vêtements amples.*

1. Assurez-vous que les portes, les panneaux, les capots et les protecteurs soient bien fermés.
2. Avant d'installer ou de connecter un système, arrêtez le moteur.
3. Seules des personnes qualifiées doivent démonter des protecteurs ou des capots pour faire l'entretien ou le dépannage nécessaire.
4. Pour empêcher un démarrage accidentel pendant l'entretien, débranchez le câble d'accumulateur à la borne négative.
5. N'approchez pas les mains ou les cheveux de pièces en mouvement; elles peuvent aussi accrocher des vêtements amples et des outils.
6. Réinstallez les capots ou les protecteurs et fermez les portes après des travaux d'entretien et avant de faire démarrer le moteur.

**AVERTISSEMENT**

**DES ÉTINCELLES PEUVENT FAIRE EXPLOSER UN ACCUMULATEUR; L'ELECTROLYTE D'UN ACCUMULATEUR PEUT BRULER LA PEAU ET LES YEUX.**

*Les accumulateurs contiennent de l'électrolyte acide et dégagent des vapeurs explosives.*

1. Portez toujours un écran facial en travaillant sur un accumulateur.
2. Arrêtez le moteur avant de connecter ou de déconnecter des câbles d'accumulateur.
3. N'utilisez que des outils anti-étincelles pour travailler sur un accumulateur.
4. N'utilisez pas une source de courant de soudage pour charger un accumulateur ou survolter momentanément un véhicule.

5. Utilisez la polarité correcte (+ et -) de l'accumulateur.

**AVERTISSEMENT**

**LA VAPEUR ET LE LIQUIDE DE REFROIDISSEMENT BRULANT SOUS PRESSION PEUVENT BRULER LA PEAU ET LES YEUX.**

*Le liquide de refroidissement d'un radiateur peut être brûlant et sous pression.*

1. N'ôtez pas le bouchon de radiateur tant que le moteur n'est pas refroidi.
2. Mettez des gants et posez un torchon sur le bouchon pour l'ôter.
3. Laissez la pression s'échapper avant d'ôter complètement le bouchon.

## 1.07 Informations Générales de Sécurité

### A Prévention D'incendie

Les opérations de soudage utilisent le feu ou la combustion comme outil de base. Ce processus est très utile quand il est correctement contrôlé.

1. La zone doit comporter un sol ignifugé.
2. Les établis ou tables utilisés pendant les opérations de soudage doivent avoir un revêtement ignifuge.
3. Utilisez des écrans résistants à la chaleur ou en matériau approuvé pour protéger les cloisons proches ou le sol vulnérable des étincelles et du métal chaud.
4. Gardez un extincteur approuvé du bon type et de la bonne taille dans la zone de travail. Inspectez-le régulièrement pour vous assurer qu'il est en état de fonctionner. Apprenez à vous en servir.
5. Enlevez tous les matériaux combustibles de la zone de travail. Si vous ne pouvez pas les enlever, protégez-les avec une couvre ignifuge.

**AVERTISSEMENT**

*N'effectuez JAMAIS d'opérations de soudage sur un récipient qui a contenu des liquides ou vapeurs toxiques, combustibles ou inflammables. N'effectuez JAMAIS d'opérations de soudage dans une zone contenant des vapeurs combustibles, des liquides inflammables ou des poussières explosives.*

**B Entretien des Locaux****AVERTISSEMENT**

*Ne laissez jamais l'oxygène en contact avec la graisse, l'huile ou d'autres substances inflammables. Bien que l'oxygène elle-même ne brûle pas, ces substances peuvent devenir extrêmement explosives. Elles peuvent prendre feu et brûler violemment en présence d'oxygène.*

Gardez **TOUS** les appareils propres et exempts de graisse, huile ou autres substances inflammables.

**C Aération****AVERTISSEMENT**

*Ventilez les zones de soudage, chauffage et découpage de façon adéquate pour éviter l'accumulation de gaz explosifs ou toxiques. Certaines combinaisons de métaux, revêtements et gaz génèrent des fumées toxiques: Utilisez un équipement de protection respiratoire dans ces circonstances. Si vous soudez ou brasez, lisez et assimilez la fiche technique de sécurité de matériau relative à l'alliage de soudage/brasage.*

**D Protection Personnelle**

Les flammes de gaz produisent une radiation infrarouge qui peut avoir un effet néfaste sur la peau, et particulièrement sur les yeux. Choisissez des lunettes ou un masque avec des verres trempés assombris au niveau 4 ou plus sombre, pour protéger vos yeux des dommages et garder une bonne visibilité sur le travail.

Portez en permanence des gants de protection et des vêtements ignifuges pour la protection de la peau et des vêtements contre les étincelles et le laitier. Gardez col, manches et poches boutonnés. Il ne faut pas remonter vos manches ou les pantalons à revers.

Quand vous travaillez dans un environnement non dédié au soudage ou découpage, portez toujours une protection des yeux appropriées ou un masque facial.

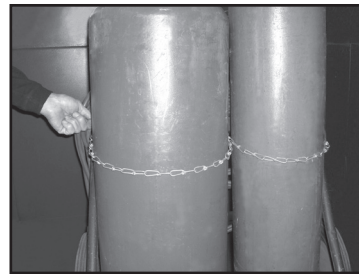
**AVERTISSEMENT**

*Mettez en pratique les procédures de sécurité et de mode opératoire suivantes à chaque fois que vous utilisez cet appareil de régulation de pression. Si vous déviez de ces procédures, cela peut entraîner incendie, explosion, dégâts matériels et/ou blessures corporelles pour l'opérateur.*

**E Bouteilles de Gaz Comprimé**

Le Département des Transports américain (DOT) approuve la conception et la fabrication des bouteilles qui contiennent les gaz utilisés pour les opérations de soudage ou de découpage.

1. Placez la bouteille (Le schéma 1) là où elle sera utilisée. Gardez-la en position verticale. Fixez-la sur un chariot une cloison, un établi, etc.



Le schéma 1-1: Cylindres de gaz



**AVERTISSEMENT**

*Les bouteilles sont sous haute pression. Manipulez-les avec précautions. Des accidents sérieux peuvent résulter d'une mauvaise manutention ou d'un mauvais emploi des bouteilles de gaz comprimé. NE faites PAS tomber la bouteille, ne la cognez pas, ne l'exposez pas à une chaleur excessive, aux flammes ou étincelles. NE la cognez PAS contre d'autres bouteilles. Contactez votre fournisseur de gaz ou reportez-vous à la publication CGA P-1 "Manipulation sécurisée des gaz comprimés en conteneur" pour plus d'informations sur l'utilisation et la manutention des bouteilles.*

**AVIS**

*Ce document CGA p. t peut être obtenu en écrivant à "Compressed Gas Association", 4221 Walney Road, 5th Floor. Chantilly, VA 20151.2923, USA.*

2. Placez le bouchon de protection de vanne sur la bouteille à chaque fois que vous la déplacez ou ne l'utilisez pas. Ne faites jamais glisser ou rouler d'aucune manière les bouteilles. Utilisez un diable approprié pour les déplacer.
3. Entreposez les bouteilles vides à l'écart des bouteilles pleines. Marquez-les "VIDE" et refermez leur vanne.
4. N'utilisez **JAMAIS** des bouteilles de gaz comprimé sans un régulateur de pression en série sur la vanne de bouteille.
5. Inspectez la vanne de bouteille pour y détecter de l'huile ou de la graisse, ou dès pièces endommagées.

**AVERTISSEMENT**

*N'UTILISEZ PAS la bouteille si vous trouvez de l'huile, de la graisse ou des pièces endommagées. Informez immédiatement votre fournisseur de gaz de cet état.*

6. Ouvrez et fermez momentanément la vanne de la bouteille, délogant ainsi d'éventuelles poussières ou saletés qui pourraient être présentes dans la vanne.

**Mise en Garde**

*Ouvrez la vanne de bouteille légèrement. Si vous l'ouvrez trop en grand, la bouteille pourrait se renverser. Quand vous ouvrez/fermez rapidement la vanne de bouteille, ne vous tenez pas directement devant. Opérez toujours cette opération dans une zone bien ventilée. Si une bouteille d'acétylène crache un brouillard, laissez reposer pendant 15 minutes. Essayez de nouveau la vanne. Si le problème persiste, contactez votre fournisseur de gaz.*

**1.08 Principales Normes De Sécurité**

Safety in Welding and Cutting, norme ANSI Z49.1, American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33128.

Safety and Health Standards, OSHA 29 CFR 1910, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, norme AWS F4.1, American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33128.

National Electrical Code, norme 70 NFPA, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, document P-1, Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, norme CSA W117.2 Association canadienne de normalisation, Standards Sales, 276 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices for Occupation and Educational Eye and Face Protection, norme ANSI Z87.1, American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, norme 51B NFPA, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

## 1.09 Graphique de Symbole

Seulement certains de ces symboles apparaîtront sur votre modèle.

	Sous Tension
	Hors Tension
	Tension dangereuse
	Augmentez/Diminuer
	Disjoncteur
	Source AC Auxiliaire
	Fusible
<b>A</b>	Intensité de Courant
<b>V</b>	Tension
<b>Hz</b>	Hertz (cycles/sec)
<b>f</b>	Fréquence
<b>-</b>	Négatif
<b>+</b>	Positif
	Courant Continue (DC)
	Terre de Protection
	Ligne
	Connexion de la Ligne
	Source Auxiliaire
<b>115V 15A</b> 	Classement de Prise-Source Auxiliaire

<b>1</b>	Mono Phasé
<b>3</b>	Trois Phasé
	Tri-Phase Statique Fréquence Convertisseur Transformateur-Redresseur
	Distant
<b>X</b>	Facteur de Marche
<b>%</b>	Pourcentage
	Panneau/Local
	Soudage Arc Electrique Avec Electrode Enrobé (SMAW)
	Soudage à L'arc Avec Fil Electrodes Fusible (GMAW)
	Soudage à L'arc Avec Electrode Non Fusible (GTAW)
	Decoupe Arc Carbone (CAC-A)
	Courant Constant
	Tension Constante Ou Potentiel Constant
	Haute Température
	Indication d'erreur
	Force d'Arc
	Amorçage de L'arc au Contact (GTAW)
	Inductance Variable
	Tension

	Déroulement du Fil
	Alimentation du Fil Vers la Pièce de Fabrication Hors Tension
	Torche de Soudage
	Purge Du Gaz
	Mode Continu de Soudure
	Soudure Par Point
	Durée du Pulse
	Durée de Pré-Débit
	Durée de Post-Débit
 Détente à 2-Temps Appuyez pour démarrer l'alimentation du fils et la soudure, le relâcher pour arrêter.	
 Détente à 4-Temps Maintenez appuyez pour pré-débit, relâchez pour initier l'arc. Appuyez pour arrêter l'arc, et maintenez pour pré-débit.	
	Problème de Terre
<b>IPM</b>	Pouces Par Minute
<b>MPM</b>	Mètres Par Minute
	Voir Note
	Voir Note
Art # A-07639F_AC	

Avis : Pour les environnements avec des risques de choc électrique, le fournisseur d'énergie portant la marque conforme à EN50192 lorsqu'utilisé en conjonction avec des lampes de poche avec des conseils exposés, si équipés avec des guide à l'hauteur de buse correctement installé.

Ne pas déposer avec les déchets ménagers.

**1.10 Declaration Of Conformity**

Manufacturer: Victor Technologies  
Address: 16052 Swingley Ridge Road, Suite 300  
St Louis, Mo63017  
USA

The equipment described in this manual has been designed to all applicable aspects and regulations of the 'Low Voltage Directive' (2006/95 EC) and to the National legislation for the enforcement of this Directive.

Serial numbers are unique with each individual piece of equipment and details description, parts used to manufacture a unit and date of manufacture.

National Standard and Technical Specifications

The product is designed and manufactured to a number of standards and technical requirements. Among them are:

- CSA E60974-1, UL60974-1 and IEC 60974-1 applicable to welding equipment and associated accessories.
- 2002/95/EC RoHS directive
- Extensive product design verification is conducted at the manufacturing facility as part of the routine design and manufacturing process. This is to ensure the product is safe, when used according to instructions in this manual and related industry standards, and performs as specified. Rigorous testing is incorporated into the manufacturing process to ensure the manufactured product meets or exceeds all design specifications.

Victor Technologies has been manufacturing products for more than 30 years, and will continue to achieve excellence in our area of manufacture.

Manufacturers responsible representative:

Tom Wermert  
Senior Brand Manager Thermal Arc  
Victor Technologies International, Inc  
16052 Swingley Ridge Road  
Chesterfield, Missouri 63017 USA



## **1.11 EMF Information**

### Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: "The body of evidence, in the committee's judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard." However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

### About Implanted Medical Devices:

Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.

## SECTION 2: INTRODUCTION

### 2.01 How To Use This Manual

To ensure safe operation, read the entire manual, including the chapter on safety instructions and warnings.

Throughout this manual, the words WARNING, CAUTION, and NOTE may appear. Pay particular attention to the information provided under these headings. These special annotations are easily recognized as follows:



#### **WARNING**

*A WARNING gives information regarding possible personal injury.*



#### **CAUTION**

*A CAUTION refers to possible equipment damage.*

#### **NOTE**

*A NOTE offers helpful information concerning certain operating procedures.*

You will also notice icons from the safety section appearing throughout the manual. These are to advise you of specific types of hazards or cautions related to the portion of information that follows. Some may have multiple hazards that apply and would look something like this:



### 2.02 Equipment Identification

The unit's identification number (specification or part number), model, and serial number usually appear on a nameplate attached to the control panel. In some cases, the nameplate may be attached to the rear panel. Equipment which does not have a control panel such as gun and cable assemblies is identified only by the specification or part number printed on the shipping container. Record these numbers on the bottom of page i for future reference.

### 2.03 Receipt Of Equipment

When you receive the equipment, check it against the invoice to make sure it is complete and inspect the equipment for possible damage due to shipping. If there is any damage, notify the carrier immediately to file a claim. Furnish complete information concerning damage claims or shipping errors to the location in your area listed in the inside back cover of this manual.

Include all equipment identification numbers as described above along with a full description of the parts in error.

### 2.04 Description

The Thermal Arc Fabricator 211i is a self contained single phase multi process welding system that is capable of performing MIG (GMAW/FCAW), STICK (SMAW) and LIFT TIG (GTAW) welding processes. The Power Source is equipped with an integrated wire feed unit, digital voltage and amperage meters, and a host of other features in order to fully satisfy the broad operating needs of the modern welding professional. The Power Source is also fully compliant to Standard CSA E60974-1-00 and UL 60974.1.

The Thermal Arc Fabricator 211i provides excellent welding performance across a broad range of applications when used with the correct welding consumables and procedures. The following instructions detail how to correctly and safely set up the machine and give guidelines on gaining the best efficiency and quality from the Power Source. Please read these instructions thoroughly before using the unit.

## 2.05 Transportation Methods

**WARNING**

*ELECTRIC SHOCK can kill. DO NOT TOUCH live electrical parts. Disconnect input power conductors from de-energized supply line before moving the welding power source.*

**WARNING**

*FALLING EQUIPMENT can cause serious personal injury and equipment damage.*

Lift Power Source with handles built into the top of the front and rear molded panels.

Use handcart or similar device of adequate capacity.

If using a fork lift vehicle, place and secure Power Source on a proper skid before transporting.

## 2.06 User Responsibility

This equipment will perform as per the information contained herein when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically. Defective equipment (including welding leads) should not be used. Parts that are broken, missing, plainly worn, distorted or contaminated, should be replaced immediately. Should such repairs or replacements become necessary, it is recommended that such repairs be carried out by appropriately qualified persons approved by Thermal Arc. Advice in this regard can be obtained by contacting an Accredited Thermal Arc Distributor.

This equipment or any of its parts should not be altered from standard specification without prior written approval of Thermal Arc. The user of this equipment shall have the sole responsibility for any malfunction which results from improper use or unauthorized modification from standard specification, faulty maintenance, damage or improper repair by anyone other than appropriately qualified persons approved by Thermal Arc.

## 2.07 Fabricator 211i Portable System Package (Part No. W1004201)

- Fabricator 211i Power Source
- 12 ft. (3.6 m) Tweco Fusion 220 Amp MIG Gun
- Victor Argon Regulator / Flowmeter
- Drive Rolls:
  - .023"/.030" (0.6/0.8mm) "V" groove,
  - .023"/.035" (0.6/0.9mm)"V" groove (fitted with .035" groove lined up) ,
  - .030"/.035" (0.8/0.9mm) "V" knurled for Flux Cored Wire,
- Contact Tips (1 each)
  - .023"(0.6mm),.030"(0.8mm),
  - .035"(0.9mm) (fitted)
  - .045"(1.1mm)
- Electrode Holder with 13 ft. (4m) lead
- Work Clamp with 10ft. (3.1m) lead
- Shielding Gas hose assembly
- 15A/20A Adapter Plug from 208/230V AC 50 Amps to 115V Amps Circuits
- Thermal Arc Cap
- Electrodes
- Large Spring
- Operating Manual
- DVD



Art # A-11370

Figure 2-1: Fabricator 211i System Packaged W1004201

## SECTION 3: SAFETY AND INSTALLATION

### 3.01 Duty Cycle

The rated duty cycle of a Welding Power Source, is a statement of the time it may be operated at its rated welding current output without exceeding the temperature limits of the insulation of the component parts. To explain the 10 minute duty cycle period the following example is used. Suppose a Welding Power Source is designed to operate at a 20% duty cycle, 210 amperes at 24.5 volts. This means that it has been designed and built to provide the rated amperage (210A) for 2 minutes, i.e. arc welding time, out of every 10 minute period (20% of 10 minutes is 2 minutes). During the other 8 minutes of the 10 minute period the Welding Power Source must idle and allowed to cool. The thermal cut out will operate if the duty cycle is exceeded.

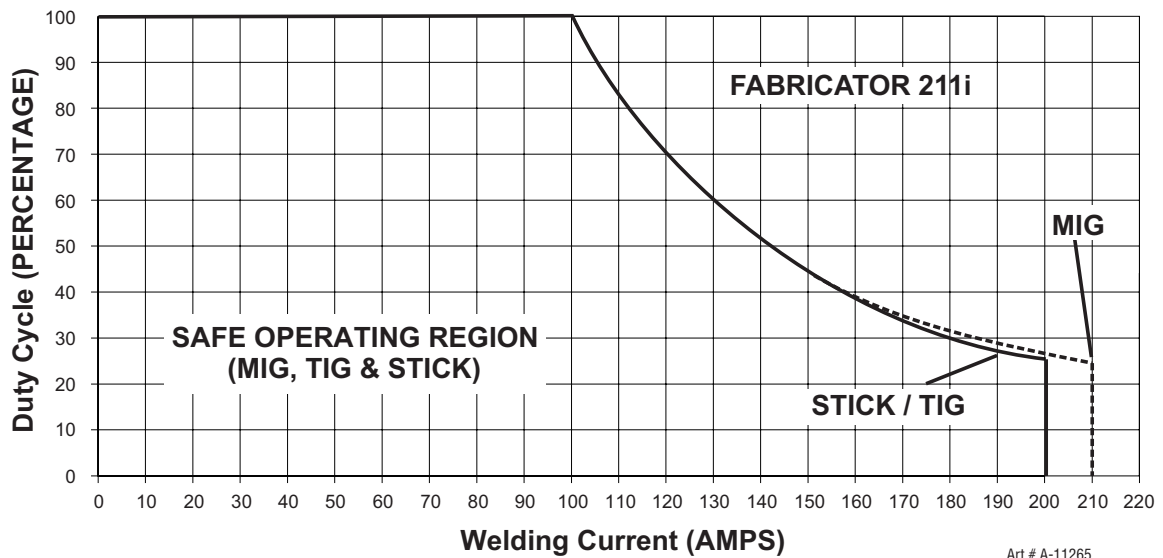


Figure 3-1: Fabricator 211i Duty Cycle on 208/230V AC

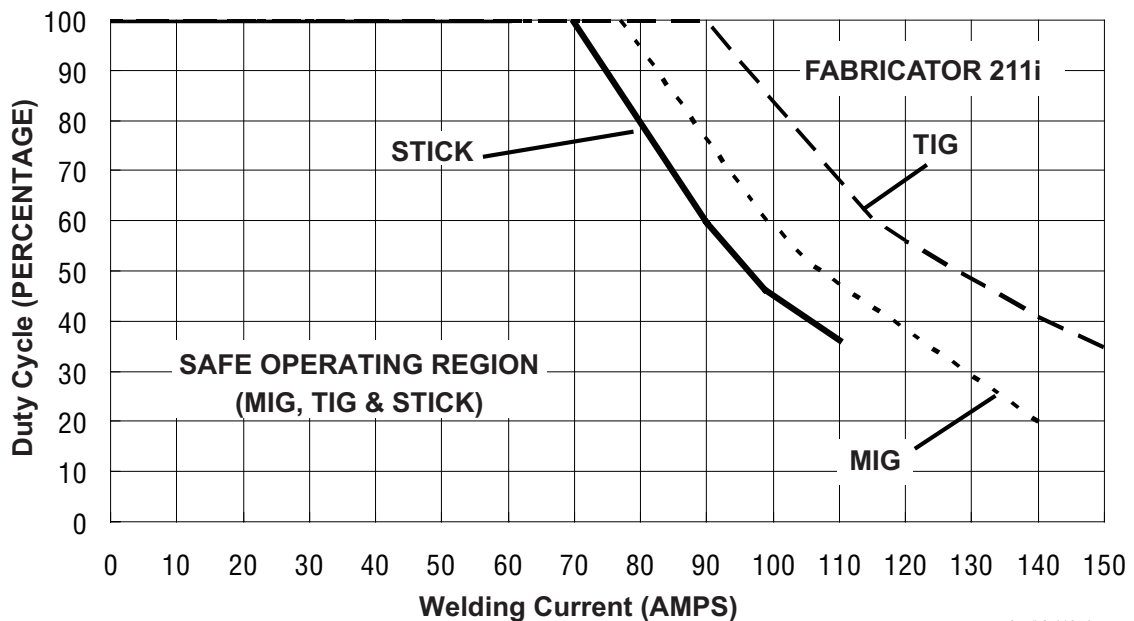


Figure 3-2: Fabricator 211i Duty Cycle on 115V AC



## 3.02 Specifications

Description	Fabricator 211i Multi Process 3 in 1 Welder	
Power Source Part No.	W1004200	
Power Source Dimensions	H17.12" x W10.47" x D 24.29" (435mm x 266mm x D617mm)	
Power Source Mass	57.3lb (26kg)	
Cooling	Fan Cooled	
Welder Type	Multi Process Welding System	
Applicable Standard	CSA E60974-1-00 / UL60974-1 / IEC 60974-1	
Number of Phases	Single Phase	
Nominal Supply Voltage	208/230 VAC $\pm$ 10%	115VAC $\pm$ 10%
Nominal Supply Frequency	50/60Hz	50/60HZ
Welding Current Range	MIG Mode STICK Mode TIG Mode	10-210 Amps 10-200 Amps 10-200 Amps
		10-140 Amps 10-110 Amps 10-150 Amps
Wirefeed Speed Range	100 - 600 IPM	100 - 400 IPM
MIG Welding Voltage Range	14.5 - 24.5V DC	14.5 - 19V DC
Nominal OCV	70V DC	
Effective Input Current ( $I_{1eff}$ )		
for MIG (GMAW/FCAW)	14.4A/11.2A	15.5A
for STICK (SMAW)	16.8A/15.8A	17.8A
for LIFT TIG (GTAW)	11.7A/11.5A	17.4A
Maximum Input Current ( $I_{1max}$ )		
for MIG (GMAW/FCAW)	32.2A/25.0A	24.5A
for STICK (SMAW)	33.6A/31.6A	30.1A
for LIFT TIG (GTAW)	23.3A/22.9A	29.4A
Single Phase Generator Requirement	7.5 KW	*3.7 KW
MIG (GMAW/FCAW) Welding Output, 104°F, 10 min.	210A @ 20%, 24.5V 122A @ 60%, 20.1V 95A @ 100%, 18.8V	110A @ 45%, 19.5V 99A @ 60%, 19.0V 77A @ 100%, 17.9V
STICK (SMAW) Welding Output, 1040°F, 10 min.	200A @ 25%, 28.0V 130A @ 60%, 25.2V 101A @ 100%, 24.0V	110A @ 35%, 24.4V 90A @ 60%, 23.6V 70A @ 100%, 22.8V
TIG (GTAW) Welding Output, 104°F, 10 min.	200A @ 25%, 18.0V 130A @ 60%, 15.2V 101A @ 100%, 14.0V	150A @ 35%, 16.0V 115A @ 60%, 14.6V 90A @ 100%, 13.6V
Open Circuit Voltage	70 V	
Protection Class	IP23S	

Table 3-1: Fabricator 211i Specifications

Note 1: The Effective Input Current should be used for the determination of cable size & supply requirements.

Note 2: Motor start fuses or thermal circuit breakers are recommended for this application. Check local requirements for your situation in this regard.

Note 3: Generator Requirements at the Maximum Output Duty Cycle.

\* Some 115 VAC, 15 amp/20 amps electrical outlets fitted with GFCI (Ground Fault Circuit Interrupt) protection against nuisance trip with this equipment due to worn or out of tolerance components in the GFCI. In such cases have the 115 VAC, 15 amp/20 amp GFCI electrical outlet replaced by a qualified electrical trades person.



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**NOTE**

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*The recommended time delay fuse or circuit breaker size for 115V is 30 amp. An individual branch circuit capable of carrying 30 amperes and protected by fuses or circuit breaker is recommended for this application. Fuse size is based on not more than 200 percent of the rated input amperage of the welding Power Source (Based on Article 630, National Electrical Code)*

*Thermal Arc continuously strives to produce the best product possible and therefore reserves the right to change, improve or revise the specifications or design of this or any product without prior notice. Such updates or changes do not entitle the buyer of equipment previously sold or shipped to the corresponding changes, updates, improvements or replacement of such items.*

*The values specified in the table above are optimal values, your values may differ. Individual equipment may differ from the above specifications due to in part, but not exclusively, to any one or more of the following; variations or changes in manufactured components, installation and conditions and local power grid supply conditions.*

### 3.03 Environment

This Power Source is designed for use in environments with increased hazard of electric shock. Additional safety precautions may be required when using unit in an environment with increased hazard of electric shock. Please refer to relevant local standards for further information prior to using in such areas.

A. Examples of environments with increased hazard of electric shock are:

1. In locations in which freedom of movement is restricted, so that the operator is forced to perform the work in a cramped (kneeling, sitting or lying) position with physical contact with conductive parts.
2. In locations which are fully or partially limited by conductive elements, and in which there is a high risk of unavoidable or accidental contact by the operator.
3. In wet or damp hot locations where humidity or perspiration considerably reduces the skin resistance of the human body and the insulation properties of accessories.

B. Environments with increased hazard of electric shock do not include places where electrically conductive parts in the near vicinity of the operator, which can cause increased hazard, have been insulated.

### 3.04 Location

Be sure to locate the welder according to the following guidelines:

- A. In areas, free from moisture and dust.
- B. Ambient temperature between 14° F (0° C) to 104° F (40° C).
- C. In areas, free from oil, steam and corrosive gases.
- D. In areas, not subjected to abnormal vibration or shock.
- E. In areas, not exposed to direct sunlight or rain.
- F. Place at a distance of 12" (305mm) or more from walls or similar that could restrict natural air flow for cooling.
- G. The enclosure design of this Power Source meets the requirements of IP23S as outlined in EN 60529. This provides adequate protection against solid objects (greater than 1/2", 12mm) and direct protection from vertical drops. Under no circumstances should the Power Source be operated or connected in a micro environment that will exceed the stated conditions. For further information please refer to EN 60529.
- H. Precautions must be taken against the power source toppling over. The power source must be located on a suitable horizontal surface in the upright position when in use.



**WARNING**

*This equipment should be electrically connected by a qualified electrician.*

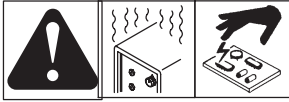
### 3.05 Ventilation



**WARNING**

*Since the inhalation of welding fumes can be harmful, ensure that the welding area is effectively ventilated.*

### 3.06 Electricity Supply



The Electricity Supply voltage should be within 208/230V AC  $\pm 10\%$  or 115 V AC  $\pm 10\%$ . Too low a supply voltage may cause poor welding performance in STICK mode such as the arc snuffing out during welding. Too high a supply voltage will cause components to overheat and possibly fail. The Welding power Source must be:

- Correctly installed, if necessary, by a qualified electrician.
- Correctly earthed (electrically) in accordance with local regulations.
- Connected to the correct size power point and fuse as per the Specifications on page 3-2.



#### WARNING

*The Fabricator 211i must be electrically connected by a qualified electrical trades-person. Damage to the PCA (Power Control Assembly) could occur if 265 VAC or higher is applied to the Primary Power Cable*



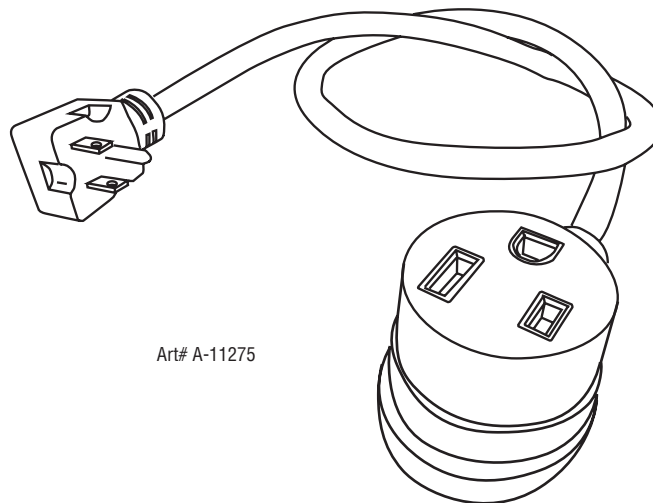
#### WARNING

*ELECTRIC SHOCK can kill; SIGNIFICANT DC VOLTAGE is present after removal of input power. **DO NOT TOUCH** live electrical parts.*

**SHUT DOWN** welding power source, disconnect input power employing lockout/tagging procedures. Lock-out/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting OFF and red-tagging circuit breaker or other disconnecting device.

#### Power Cords Included With Power Supply

Attached to the power supply is an input power cord with a 208/230Volt 50 Amp NEMA 6-50 P for plug. Supplied adapter allow for connection of the power supply input cable plug to 115 V input power.



Art# A-11275

Figure 3-3: 115 VAC Adapter

**Electrical Input Requirements**

Operate the welding power source from a single-phase 50/60 Hz, AC power supply. The input voltage must match one of the electrical input voltages shown on the input data label on the unit nameplate. Contact the local electric utility for information about the type of electrical service available, how proper connections should be made, and inspection required. The line disconnect switch provides a safe and convenient means to completely remove all electrical power from the welding power supply whenever necessary to inspect or service the unit. The Welding Power Source must be:

**Do not** connect in input (WHITE or BLACK) conductor to the ground terminal.

**Do not** connect the ground (GREEN) conductor to an input line terminal.

- Correctly installed, if necessary, by a qualified electrician.
- Correctly earthed (electrically) in accordance with local regulations.
- Connected to the correct size power point, fuse and primary supply lead based on Table 3-2.

Refer to Figure 3-3 and Table 3-2.

**WARNING**

*An electrical shock or fire hazard is probable if the following electrical service guide recommendations are not followed. These recommendations are for a dedicated branch circuit sized for the rated output and duty cycle of the welding Power Source.*

	<b>50 / 60 Hz Single Phase Supply</b>	
Supply Voltage	<b>208/230V AC</b>	<b>115V AC</b>
Input Current at Maximum Output	32 Amps	30 Amps
Maximum Recommended Fuse* or Circuit Breaker Rating * Time Delay Fuse, UL class RK5. Refer to UL248	50 Amps	30 Amps
Maximum Recommended Fuse^ or Circuit Breaker Rating ^Normal Operating , UL class K5. Refer to UL248	50 Amps	30 Amps
Minimum Recommended Cord Size	12 AWG	12 AWG
Maximum Recommended Extension Cord Length	50 ft	25 ft
Minimum Recommended Grounding Conductor Size	12 AWG	12AWG

Table 3-2: Electrical Service Guide

**CAUTION**

*The time-delay fuses or circuit breaker of an individual branch circuit may have nuisance tripping when welding with this product due to the amperage rating of the time-delay fuses or circuit breaker.*

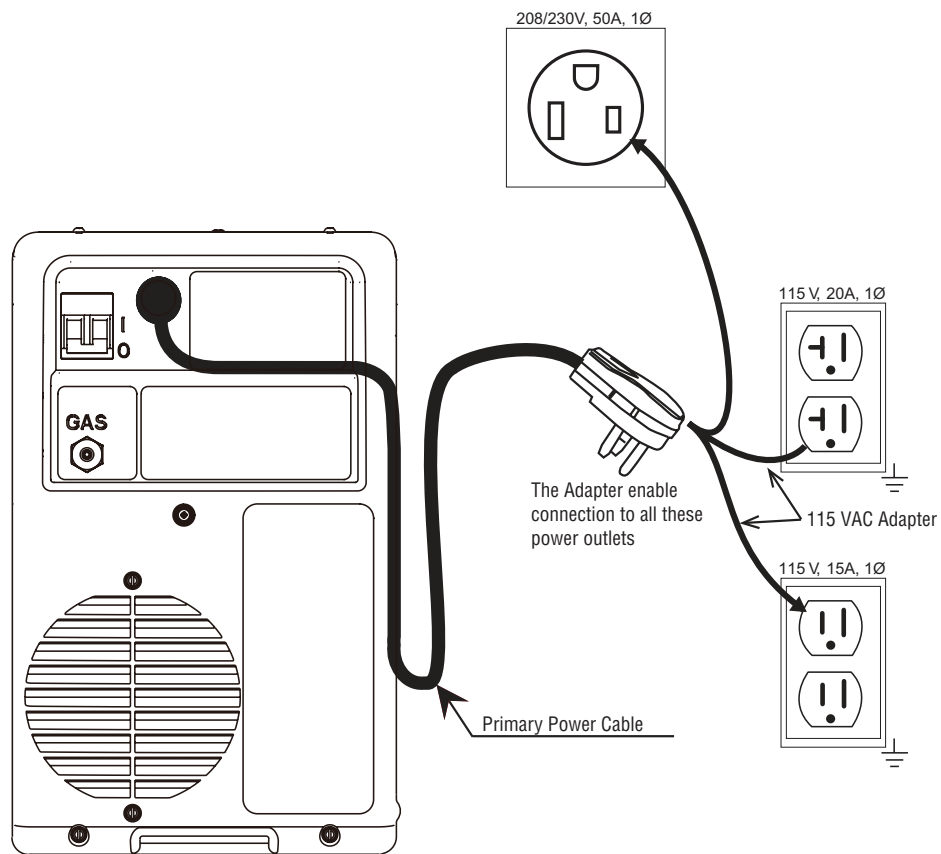


Figure 3-4: Electrical Input Connections

### 3.07 Electromagnetic Compatibility

**WARNING**

*Extra precautions for Electromagnetic Compatibility may be required when this Welding Power Source is used in a domestic situation.*

#### A. Installation and Use - Users Responsibility

The user is responsible for installing and using the welding equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing the welding circuit, see NOTE below. In other cases it could involve constructing an electromagnetic screen enclosing the Welding Power Source and the work, complete with associated input filters. In all cases, electromagnetic disturbances shall be reduced to the point where they are no longer Troublesome.

**NOTE**

*The welding circuit may or may not be earthed for safety reasons. Changing the earthing arrangements should only be authorized by a person who is competent to assess whether the changes will increase the risk of injury, e.g. by allowing parallel welding current return paths which may damage the earth circuits of other equipment.*

#### B. Assessment of Area

Before installing welding equipment, the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account.

1. Other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment.
2. Radio and television transmitters and receivers.
3. Computer and other control equipment.
4. Safety critical equipment, e.g. guarding of industrial equipment.
5. The health of people around, e.g. the use of pace-makers and hearing aids.
6. Equipment used for calibration and measurement.
7. The time of day that welding or other activities are to be carried out.
8. The immunity of other equipment in the environment: the user shall ensure that other equipment being used in the environment is compatible: this may require additional protection measures.

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

#### C. Methods of Reducing Electromagnetic Emissions

##### 1. Electricity Supply

Welding equipment should be connected to the Electricity Supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the Electricity Supply. Consideration should be given to shielding the supply cable of permanently installed welding equipment in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the Welding Power Source so that good electrical contact is maintained between the conduit and the Welding Power Source enclosure.

## 2. Maintenance of Welding Equipment

The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturer's instructions.

## 3. Welding Cables

The welding cables should be kept as short as possible and should be positioned close together but never coiled and running at or close to the floor level.

## 4. Equipotential Bonding

Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching the metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

## 5. Earthing/grounding of the Work Piece

Where the work piece is not bonded to earth for electrical safety, nor connected to earth because of its size and position, e.g. ship's hull or building steelwork, a connection bonding the work piece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the work piece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the work piece to earth should be made by direct connection to the work piece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

## 6. Screening and Shielding

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening the entire welding installation may be considered for special applications.

### 3.08 Victor Regulator

Pressure regulator (Figure 3-5) attached to the cylinder valve reduce high cylinder pressures to suitable low working pressures for welding, cutting, and other applications.

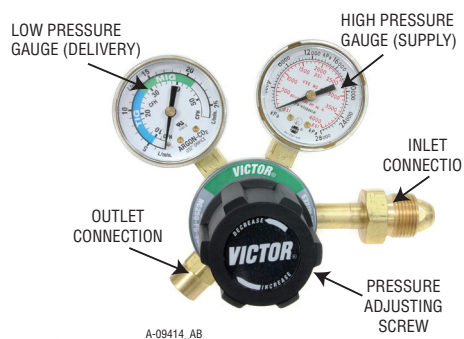


Figure 3-5: Victor CS Regulator



**WARNING**

*Use the regulator for the gas and pressure for which it is designed. NEVER alter a regulator for use with any other gas.*

---

**NOTE**

---

*Regulators purchased with open 1/8", 1/4", 3/8", or 1/2" NPT ports must be assembled to their intended system.*

1. Note the maximum inlet pressure stamped on the regulator. DO NOT attach the regulator to a system that has a higher pressure than the maximum rated pressure stamped on the regulator.
2. The regulator body will be stamped "IN" or "HP" at the inlet port. Attach the inlet port to the system supply pressure connection.
3. If gauges are to be attached to the regulator and the regulator is stamped and listed by a third party (i.e. "UL" or "ETL"). The following requirements must be met:
  - a) Inlet gauges over 1000 PSIG (6.87 mPa) shall conform with the requirements of UL 404, "Indicating Pressure Gauges for Compressed Gas Service."
  - b) Low pressure gauges must be UL recognized for the class of regulator they are being used on according to UL252A.



---

**WARNING**

---

*DO NOT use a regulator that delivers pressure exceeding the pressure rating of the downstream equipment unless provisions are made to prevent over-pressurization (i.e. system relief valve). Make sure the pressure rating of the downstream equipment is compatible with the maximum delivery pressure of the regulator.*

---

4. Be sure that the regulator has the correct pressure rating and gas service for the cylinder used.
5. Carefully inspect the regulator for damaged threads, dirt, dust, grease, oil, or other flammable substances. Remove dust and dirt with a clean cloth. Be sure the inlet swivel filter is clean and in place. Attach the regulator (Figure 3-6) to the cylinder valve. Tighten securely with a wrench.



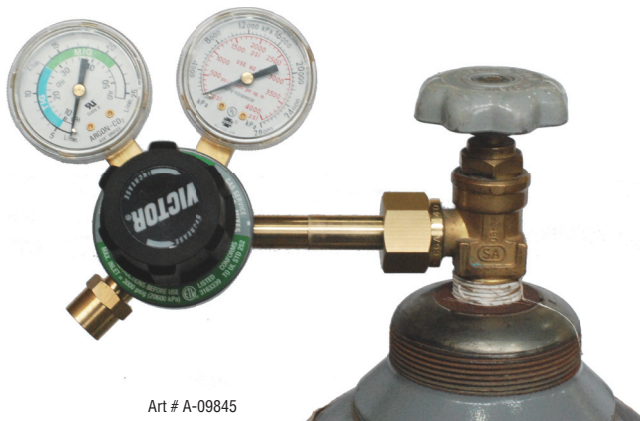
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**WARNING**

---

*DO NOT attach or use the regulator if oil, grease, flammable substances or damage is present! Have a qualified repair technician clean the regulator or repair any damage.*

---



Art # A-09845

Figure 3-6: Regulator to Cylinder Valve

6. Before opening the cylinder valve, turn the regulator adjusting screw counterclockwise until there is no pressure on the adjusting spring and the screw turns freely.



7. Relief Valve (where provided): The relief valve is designed to protect the low pressure side of the regulator from high pressures. Relief valves are not intended to protect downstream equipment from high pressures.

**WARNING**

---

*DO NOT tamper with the relief valve or remove it from the regulator.*

---

**WARNING**

---

*Stand to the side of the cylinder opposite the regulator when opening the cylinder valve. Keep the cylinder valve between you and the regulator. For your safety, NEVER STAND IN FRONT OF OR BEHIND A REGULATOR WHEN OPENING THE CYLINDER VALVE!*

---

8. Slowly and carefully open the cylinder valve (Figure 3-7) until the maximum pressure shows on the high pressure gauge.

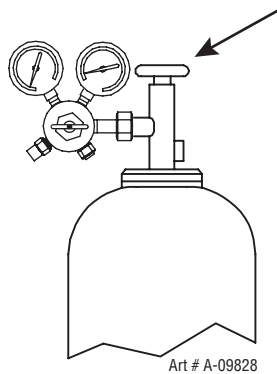


Figure 3-7: Open Cylinder Valve

9. On all cylinders, except acetylene, open the valve completely to seal the valve packing. On gaugeless regulators, the indicator will register the cylinder contents open.
10. On acetylene cylinders, open the valve 3/4 of a turn and no more than 1-1/2.

**WARNING**

---

*Acetylene delivery pressure must not exceed 15 PSIG (103 kPa) or 30 PSIG (207 kPa). Acetylene can dissociate (decompose with explosive violence) above these pressure limits.*

---

**CAUTION**

---

*Keep the cylinder valve wrench, if one is required, on the cylinder valve to turn off the cylinder quickly, if necessary.*

---

11. Attach the desired downstream equipment.

### 3.09 Leak Testing The System

Leak test the system before putting into operation.

1. Be sure that there is a valve in the downstream equipment to turn off the gas flow.
2. With the cylinder valve open, adjust the regulator to deliver the maximum required delivery pressure.
3. Close the cylinder valve.
4. Turn the adjusting screw/knob counterclockwise one turn.
  - a) If the high-pressure gauge reading drops, there is a leak in the cylinder valve, inlet fitting, or high-pressure gauge.
  - b) If the low-pressure gauge drops, there is a leak in the downstream equipment, hose, hose fitting, outlet fitting or low-pressure gauge. Check for leaks using an approved leak detector solution.
  - c) If the high-pressure gauge drops and the low-pressure gauge increases at the same time, there is a leak in the regulator seat.
  - d) If the regulator requires service or repair, take it to a qualified repair technician.
5. Once leak testing has been performed and there are no leaks in the system, slowly open the cylinder valve and proceed.



#### **WARNING**

*If a leak has been detected anywhere in the system, discontinue use and have the system repaired. DO NOT use leaking equipment. Do not attempt to repair a leaking system while the system is under pressure.*

### 3.10 When You Finish Using The Regulator

1. Close the cylinder valve.
2. Open the valve on the downstream equipment. This drains all pressure from the system.
3. Close the valve on the downstream equipment.
4. Turn the adjusting screw counterclockwise to release the tension on the adjusting spring.
5. Check the gauges after a few minutes for verification that the cylinder valve is closed completely.

### 3.11 Storage Of The Regulator

When the regulator is not in use and has been removed from the cylinder, it should be stored in an area where it will be protected from dust, oil, and grease. The inlet and outlet should be capped to protect against internal contamination and prevent insects from nesting.

### 3.12 Volt-Ampere Curves

Voltage-Amperage Curves shows maximum voltage and amperage output capabilities of welding power source. Curves of other settings fall between curves shown.

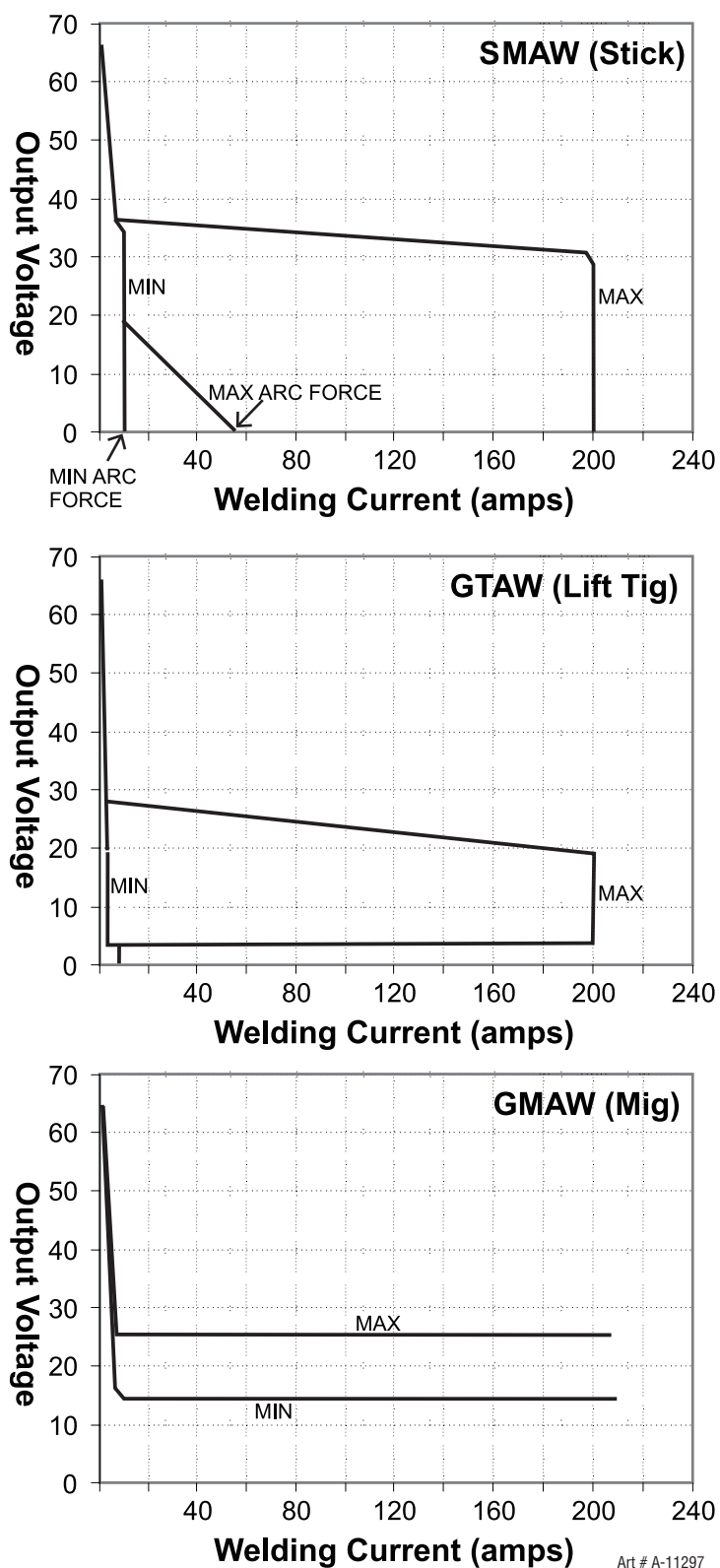


Figure 3-8: Fabricator 211i Volt-Ampere Curves

## Notes

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## SECTION 4: OPERATION

### 4.01 Fabricator 211i Power Source Controls, Indicators And Features

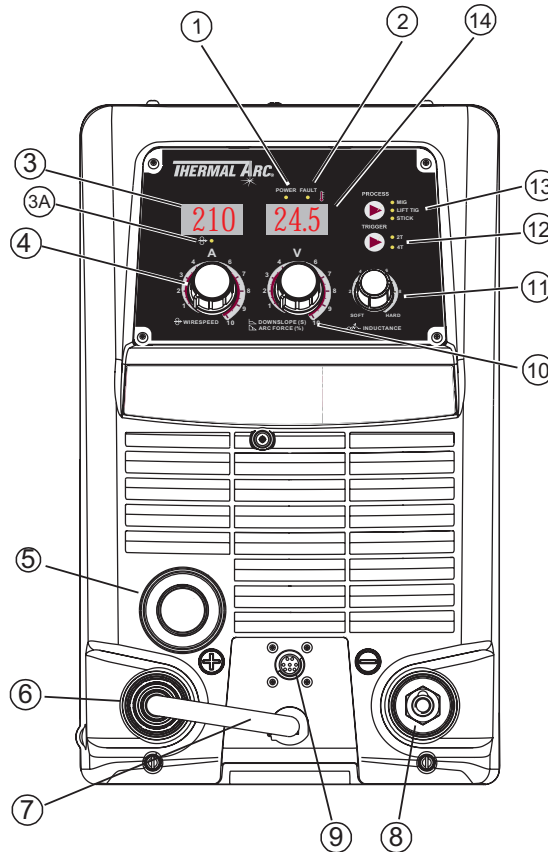
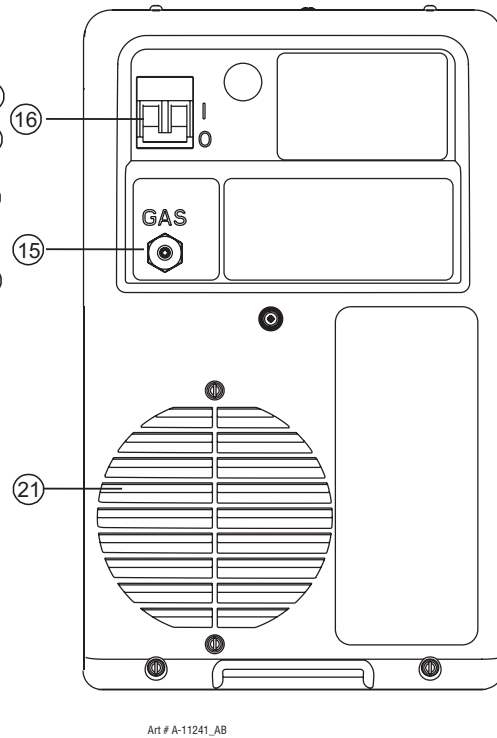
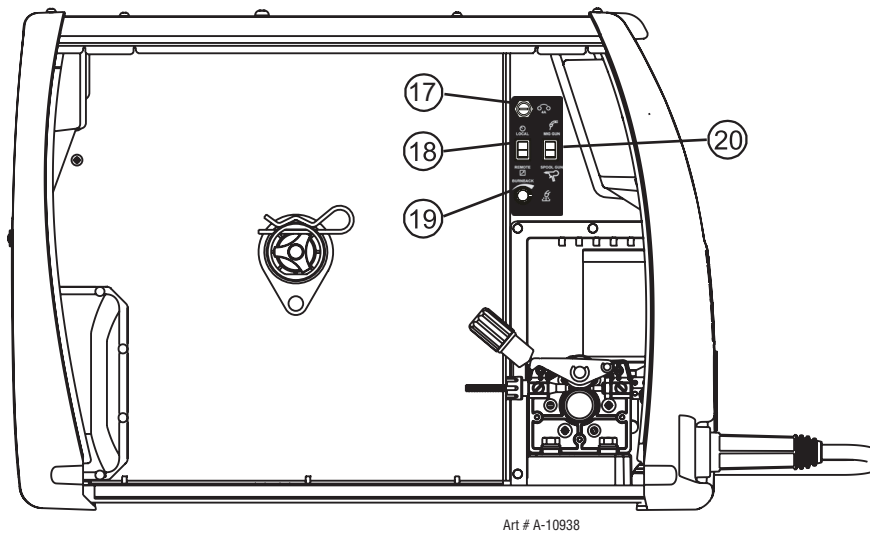


Figure 4-1: Front and Control Panel



Art # A-11241\_AB

Figure 4-2: Rear Panel Connections



Art # A-10938

Figure 4-3: Wire Feed Compartment Control

**1. Power Indicator**

The power indicator is illuminated when the correct mains power is applied to the power source and when the ON/OFF switch located on the rear panel is in the ON position.

**2. Thermal Overload Indicator (Fault Indicator)**

This welding power source is protected by a self resetting thermostat. The indicator will illuminate if the duty cycle of the power source has been exceeded. Should the thermal overload indicator illuminate the output of the power source will be disabled. Once the power source cools down this light will go OFF and the over temperature condition will automatically reset. Note that the mains power switch should remain in the on position such that the fan continues to operate thus allowing the unit to cool sufficiently. Do not switch the unit off should a thermal overload condition be present.

**3. Digital Wirespeed/Amperage Meter (Left Digital Display)****MIG Mode**

This digital meter is used to display the pre-set (preview) Wirefeed Speed in IPM (Inches per minute) in MIG mode and actual welding amperage of the power source when welding. At times of non-welding, the digital meter will display a pre-set (preview) value of Wirefeed Speed. This value can be adjusted by varying the Amperage Control Knob (4).

**STICK and LIFT TIG Modes**

The digital meter is used to display the pre-set (preview) amperage in STICK / LIFT TIG modes and actual welding amperage of the power source when welding. At times of non-welding, the amperage meter will display a pre-set (preview) value in both STICK and LIFT TIG modes. This value can be adjusted by varying the Amperage Control Knob (4).

When welding, this digital meter will display actual welding amperage in all modes.

At the completion of welding, the digital meter will hold the last recorded amperage value for a period of approximately 10 seconds in all modes. The amperage meter will hold the value until; (1) any of the front panel controls are adjusted in which case the unit will revert to preview mode, (2) welding is recommenced, in which case actual welding amperage will be displayed, or (3) a period of 10 seconds elapses following the completion of welding in which case the unit will return to preview mode.

---

**NOTE**

*The preview functionality provided on this power source is intended to act as a guide only. Some differences may be observed between preview values and actual welding values due to factors including the mode of welding, differences in consumables/gas mixtures, individual welding techniques and the transfer mode of the welding arc (ie dip versus spray transfer). Where exact settings are required (in the case of procedural work), it is recommended that alternate measurement methods be utilized to ensure output values are accurate.*

**3A Wirespeed Indicator**

The Wirespeed Indicator illuminates when MIG mode is selected to identify that the Digital Wirespeed/Amperage Meter is previewing Wirespeed in IPM (inches per minute).

The Wirespeed Indicator extinguishes when the user is MIG (GMAW/FCAW) welding or depressing the MIG gun trigger and the Digital Wirespeed/Amperage Meter displays actual welding amperage of the power source.

#### 4. Wirespeed/Amperage Control

In MIG mode, the Wirespeed/Amperage control knob adjusts the speed of the wire feed motor (which in turn adjusts the output current by varying the amount of MIG wire delivered to the welding arc). The optimum wire speed depends upon the material type and the welding application. The setup chart on the inside of the wire feed compartment door provides a brief summary of the required settings for a basic range of MIG (GMAW/FCAW) welding applications.

In STICK and LIFT TIG modes, the Wirespeed/Amperage control knob adjusts the amount of amperage (weld current) delivered to the welding arc by the Power Source. It directly adjusts the Power Source to deliver the desired level of weld current.

#### NOTE

*The preview functionality provided on this power source is intended to act as a guide only. Some differences may be observed between preview values and actual welding values due to factors including the mode of welding, differences in consumables/gas mixtures, individual welding techniques and the transfer mode of the welding arc (ie dip versus spray transfer). Where exact settings are required (in the case of procedural work), it is recommended that alternate measurement methods be utilized to ensure output values are accurate.*

#### 5. MIG Gun Adapter (Tweco Style)

The MIG Gun adapter is the connection point for the Tweco Fusion MIG Gun. Connect the MIG Gun by pushing the MIG Gun connector into the brass MIG Gun Adapter firmly and screw the locking screw in the MIG Gun Adapter within the Wire Feed Compartment to secure the Tweco Fusion MIG Gun in position. Failure to properly lock the Tweco MIG Gun into the MIG Gun Adapter will result in the Tweco Fusion MIG Gun being pushed out of the MIG Gun Adapter by the MIG welding wire or lack of shielding gas (porosity in the weld) at the weld zone. To remove the MIG gun simply reverse these directions.

#### 6. Positive Welding Output Terminal

The positive welding terminal is used to connect the welding output of the power source to the appropriate welding accessory such as the MIG gun (via the MIG polarity lead), electrode holder lead or work lead. Positive welding current flows from the power source via this heavy duty bayonet type terminal. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.



**CAUTION**

*Loose welding terminal connections can cause overheating and result in the male plug being fused in the bayonet terminal.*

#### 7. MIG Polarity Lead

The polarity lead is used to connect the MIG gun to the appropriate positive or negative output terminal (allowing polarity reversal for different welding applications). In general, the polarity lead should be connected in to the positive welding terminal (+) when using steel, stainless steel or aluminum electrode wire. When using gasless wire, the polarity lead is generally connected to the negative welding terminal (-). If in doubt, consult the manufacturer of the electrode wire for the correct polarity. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.



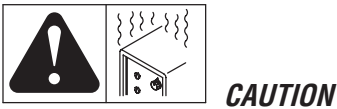
**CAUTION**

*Loose welding terminal connections can cause overheating and result in the male plug being fused in the bayonet terminal.*



8. Negative Welding Output Terminal

The negative welding terminal is used to connect the welding output of the power source to the appropriate welding accessory such as the MIG gun (via the MIG polarity lead), TIG torch or work lead. Negative welding current flows to the power source via this heavy duty bayonet type terminal. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.



*Loose welding terminal connections can cause overheating and result in the male plug being fused in the bayonet terminal.*

9. Remote Control Socket

The 8 pin Remote Control Socket is used to connect remote control devices to the welding power source. To make connections, align keyway, insert plug, and rotate threaded collar fully clockwise.

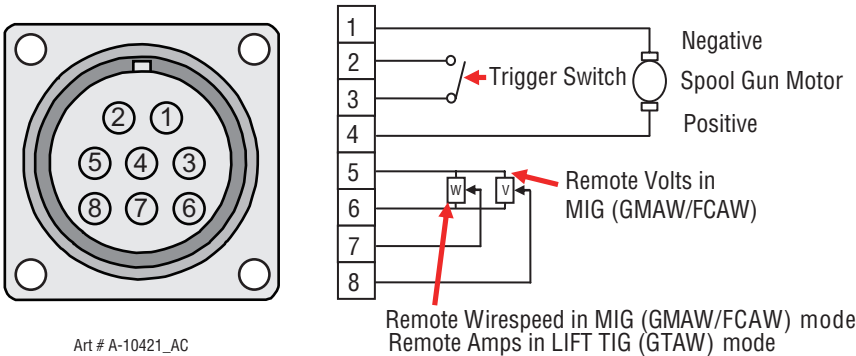


Figure 4-4: Remote Control Socket

Socket Pin	Function
1	Spool Gun Motor Negative
2	Trigger Switch Input
3	Trigger Switch Input
4	Spool Gun Motor (+24V DC)
5	5k ohm (maximum) connection to 5k ohm remote control potentiometer.
6	Zero ohm (minimum) connection to 5k ohm remote control potentiometer.
7	Wiper arm connection to 5k ohm remote control Wirespeed MIG mode potentiometer. Wiper arm connection to 5k ohm remote control Amps LIFT TIG mode potentiometer.
8	Wiper arm connection to 5k ohm remote control Volts MIG mode potentiometer.

Table 4- 1

Note that the local/ remote switch (item 18) located in the wirefeed compartment should be set to remote for the amperage/voltage controls to be operative.

## **10. Multifunction Control - Voltage, Down Slope & Arc Force**

The multifunction control knob is used to adjust Voltage (MIG Mode), Down slope (LIFT TIG Mode) and Arc Force (STICK Mode) depending on the welding mode selected.

### **NOTE**

*The preview functionality provided on this power source is intended to act as a guide only. Some differences may be observed between preview values and actual welding values due to factors including the mode of welding, differences in consumables/gas mixtures, individual welding techniques and the transfer mode of the welding arc (ie dip versus spray transfer). Where exact settings are required (in the case of procedural work), it is recommended that alternate measurement methods be utilized to ensure output values are accurate.*

### **When MIG Mode is Selected**

In this mode the control knob is used to adjust the output voltage of the unit. The welding voltage is increased by turning the knob clockwise or decreased by turning the knob anti-clockwise. The optimum voltage level required will dependent on the type of welding application. The setup chart on the inside of the wire feed compartment door provides a brief summary of the required output settings for a basic range of MIG welding applications.

### **When STICK Mode is Selected**

In this mode the multifunction control knob is used to adjust arc force. Arc force control provides an adjustable amount of welding force (or “dig”) control. This feature can be particularly beneficial in providing the operator the ability to compensate for variability in joint fit-up in certain situations with particular electrodes. In general increasing the arc force control toward ‘10’ (maximum arc force) allows greater penetration control to be achieved. Arc force is increased by turning the control knob clockwise or decreased by turning the knob anti-clockwise

### **When LIFT TIG Mode is Selected**

In this mode the multifunction control knob is used to adjust down slope. Down slope allows the user to select the ramp down time at the completion of the weld. The main function of down slope is to allow the welding current to be gradually reduced over a pre-set time frame such that the welding pool is given time to cool sufficiently.

Note that when in 2T normal mode (refer item 12), the unit will enter down slope mode as soon as the trigger switch is released (ie if the multifunction control knob is set to 5, the unit will ramp down from the present welding current to zero over 5 seconds). If no down slope time is selected then the welding output will cease immediately. If the unit is set to 4T latch mode, to enter down slope mode the trigger must be held in for the selected time period (ie press and release trigger to commence welding, then press and hold trigger again to enter down slope mode). Should the trigger be released during the down slope phase (4T only), the output will cease immediately.

## **11. Arc Control (Inductance)**

The arc control operates in MIG mode only and is used to adjust the intensity of the welding arc. Lower arc control settings make the arc softer with less weld spatter. Higher arc control settings give a stronger driving arc which can increase weld penetration. Soft means maximum inductance while Hard means minimum inductance.

## **12. Trigger Mode Control (MIG and LIFT TIG Mode only)**

The trigger mode control is used to switch the functionality of the of the torch trigger between 2T (normal) and 4T (latch mode)

### **2T (Normal Mode)**

In this mode, the torch trigger must remain depressed for the welding output to be active. Press and hold the torch trigger to activate the power source (weld). Release the torch trigger switch to cease welding.

**4T (Latch Mode)**

This mode of welding is mainly used for long welding runs to reduce operator fatigue. In this mode the operator can press and release the torch trigger and the output will remain active. To deactivate the power source, the trigger switch must again be depressed and released, thus eliminating the need for the operator to hold the torch trigger.

Note that when operating in LIFT TIG mode, the power source will remain activated until the selected downslope time has elapsed (refer Item 10).

**13. Process Selection Control**

The process selection control is used to select the desired welding mode. Three modes are available, MIG (GMAW/FCAW), LIFT TIG (GTAW) and STICK (SMAW) modes. Refer to section 4.09 or 4.10 for MIG (GMAW/FCAW) set up details, section 4.12 for LIFT TIG (GTAW) set-up details or section 4.13 for STICK (SMAW) set-up details.

Note that when the unit is powered off the mode selection control will automatically default to MIG mode. This is necessary so as to prevent inadvertent arcing should an electrode holder be connected to the unit and mistakenly be in contact with the work piece during power up.

**14. Digital Voltage Meter (Right Digital Display)****MIG Mode**

This digital meter is used to display the pre-set (preview) Voltage in MIG mode and actual welding voltage of the power source when welding. At times of non-welding, the digital meter will display a pre-set (preview) value of Voltage. This value can be adjusted by varying the Multifunction Control Knob (10).

**STICK and LIFT TIG Modes**

This digital meter is used to display the Welding Output Terminal Voltage in STICK / LIFT TIG modes during non-welding or welding. This value cannot be adjusted by varying the Multifunction Control Knob (10).

When welding, this digital meter will display actual welding voltage in all modes.

At the completion of welding, the digital meter will hold the last recorded voltage value for a period of approximately 10 seconds in all modes. The voltage meter will hold the value until; (1) any of the front panel controls are adjusted in which case the unit will revert to preview mode, (2) welding is recommenced, in which case actual welding amperage will be displayed, or (3) a period of 10 seconds elapses following the completion of welding in which case the unit will return to preview mode.

**NOTE**

*The preview functionality provided on this power source is intended to act as a guide only. Some differences may be observed between preview values and actual welding values due to factors including the mode of welding, differences in consumables/gas mixtures, individual welding techniques and the transfer mode of the welding arc (ie dip versus spray transfer). Where exact settings are required (in the case of procedural work), it is recommended that alternate measurement methods be utilized to ensure output values are accurate.*

**15. Gas Inlet (MIG mode only for MIG Gun or Spool Gun operation)**

The Gas Inlet connection, 5/8-18 UNF female thread is used to supply the appropriate MIG welding gas to the Power Source. Refer to section 4.09 or 4.10 for MIG (GMAW/FCAW) set up details

**WARNING**

*Only Inert Shielding Gases specifically designed for welding applications should be used.*

**16. On / Off Switch**

This Single Phase circuit breaker performs a dual function.

It is used to turn the unit on/off and it will also trip in the event of a fault.



**WARNING**

*When the front digital displays are lit, the machine is connected to the Electricity Supply and the internal electrical components are at Mains voltage potential.*

### 17. Wiredrive Motor Circuit Breaker

The 4A Circuit Breaker protects the unit from electrical faults and will operate in the event of a motor overload.

#### **NOTE**

*If a circuit breaker trips, a short cooling period must be allowed before an attempt is made to reset the unit by pressing the circuit breaker reset button.*

### 18. Local / Remote Switch (located in wirefeed compartment)

The local/ remote switch is used only when a remote control device (such as a TIG torch with remote current control) is fitted to the unit via the remote control socket (item 9). When the local/ remote switch is in the remote position, the unit will detect a remote device and work accordingly. When in the local mode, the unit will not detect the remote device and will operate from the power source controls only. Note that the trigger will operate at all times on the remote control socket irrespective of the position of the local/ remote switch (ie in both local and remote modes).

Should a remote device be connected and the local/ remote switch set to remote, the maximum setting of the power source will be determined by the respective front panel control, irrespective of the remote control device setting. As an example, if the output current on the power source front panel is set to 50% and the remote control device is set to 100%, the maximum achievable output from the unit will be 50%. Should 100% output be required, the respective front panel control must be set to 100%, in which case the remote device will then be able to control between 0-100% output.

### 19. Burnback Control (located in wirefeed compartment)

The burnback control is used to adjust the amount of MIG wire that protrudes from the MIG gun after the completion of MIG welding (commonly referred to as stick out). To decrease the burnback time (or lengthen the amount of wire protruding from the MIG gun at the completing of welding), turn the burnback control knob anti clockwise. To increase the burnback time (or shorten the amount of wire protruding from the torch at the completing of welding), turn the Burnback Control knob clockwise.

### 20. MIG Gun & Spool Gun Switch

The MIG Gun / Spool Gun switch is used to switch welding mode between MIG Gun functionality and Spool Gun functionality

### 21. Cooling Fan

When the Fabricator 211i is powered up, the fan turns on for approximately 3 seconds and turns off. At the time of welding, the fan turns on when welding is started, and will stay on for 10 minutes after you stop welding. After the 10 minutes has elapsed, the fan will turn off.

In STICK mode, the fan is on all the time.

The Fabricator 211i is designed with an intelligent fan control. It automatically switches the cooling fan off when it is not required. This has two main advantages; (1) to minimize power consumption, and (2) to minimize the amount of contaminants such as dust that are drawn into the power source.

Note that the fan will only operate when required for cooling purposes and will automatically switch off when not required.

## 4.02 Attaching The TWECO Fusion 220A MIG Gun

Fit the Fusion MIG gun to the power source by pushing the MIG gun connector into the MIG gun adapter and screwing the locking screw clockwise to secure the MIG gun to the MIG gun adapter.

Connect the 8 pin plug by aligning the keyway then inserting the 8 pin plug into the 8 pin socket and rotate threaded collar fully clockwise to lock the plug into position.

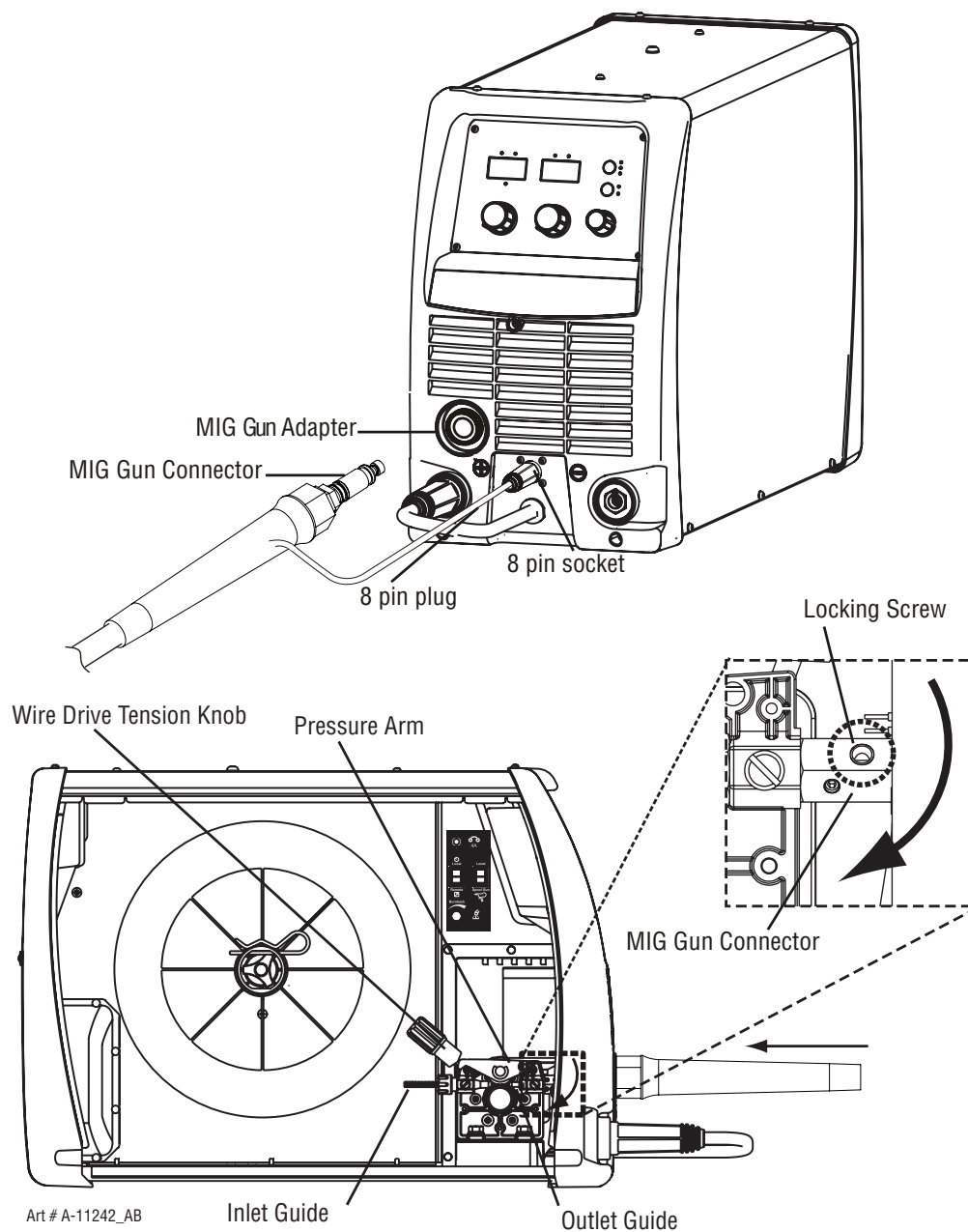


Figure 4-5: Attaching MIG Gun

### 4.03 Installing 33/44 lb Spool (12" diameter)

As delivered from the factory, the unit is fitted with a Wire Spool Hub which accepts a Spool of 33/44 lb. or 12" diameter. Installation of wire spool, Refer to Figure 4-6.

1. Remove Wire Spool Hub Retaining Clip. Grasp the loop and pull.
2. Place Wire Spool onto the hub, loading it so that the wire will feed off the bottom of the spool as the spool rotates counter clockwise. Make sure to align the spool alignment pin on the hub with the mating hole in the wire spool.
3. Replace the Wire Spool Hub Retaining Clip in the set of holes closest to the spool.

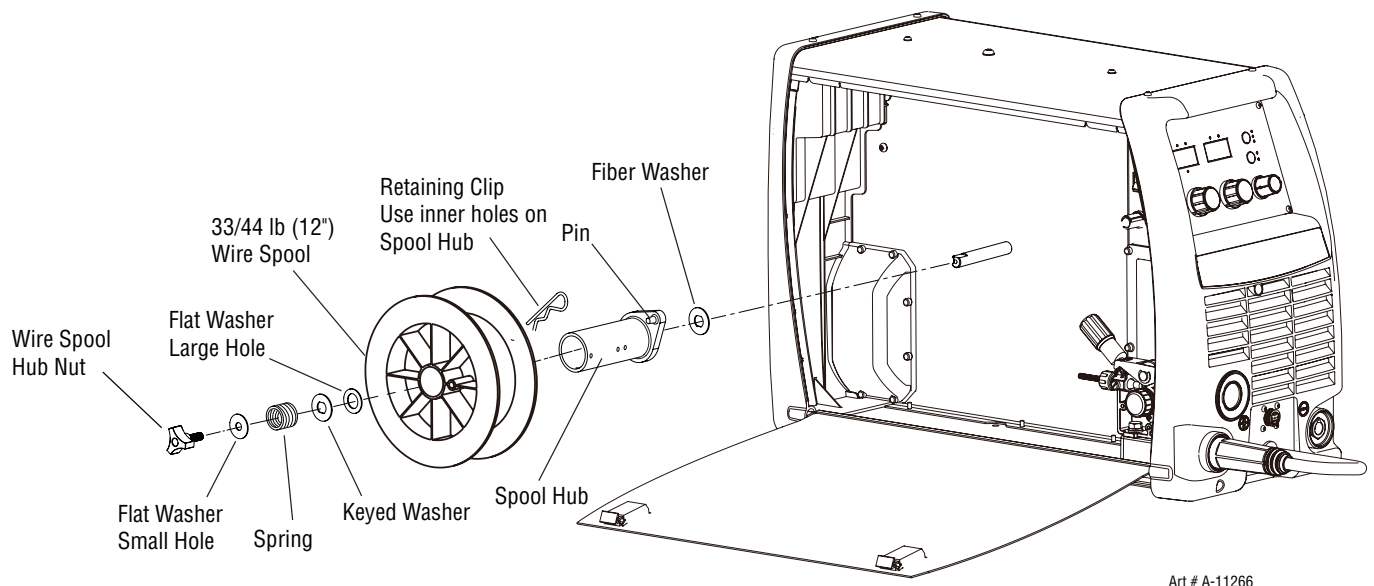
#### **NOTE**

*The Hub tension has been pre-adjusted at the factory. However if adjustment is required, refer to Section 4.09.*



#### **CAUTION**

*Use care in handling the spooled wire as it will tend to "unravel" when loosened from the spool. Grasp the end of the wire firmly and don't let go of it.*



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Figure 4-6: 33/44 lb (12") Spool Installation

## 4.04 Installing 12.5 lb Spool ( 8" diameter)

In order to fit a 12.5 lb spool (8" diameter) assemble parts in the sequence shown in Figure 4-7.

Installation of wire spool:

1. Remove Wire Spool Hub Retaining Clip. Grasp the loop and pull.
2. Place Wire Spool onto the hub, loading it so that the wire will feed off the bottom of the spool as the spool rotates counter clockwise. Make sure to align the spool alignment pin on the hub with the mating hole in the wire spool.
3. Replace the Wire Spool Hub Retaining Clip in the set of holes closest to the spool.

### NOTE

*The Hub tension has been pre-adjusted at the factory. However if adjustment is required, refer to section 4.09.*



### CAUTION

*Use care in handling the spooled wire as it will tend to "unravel" when loosened from the spool. Grasp the end of the wire firmly and don't let go of it.*

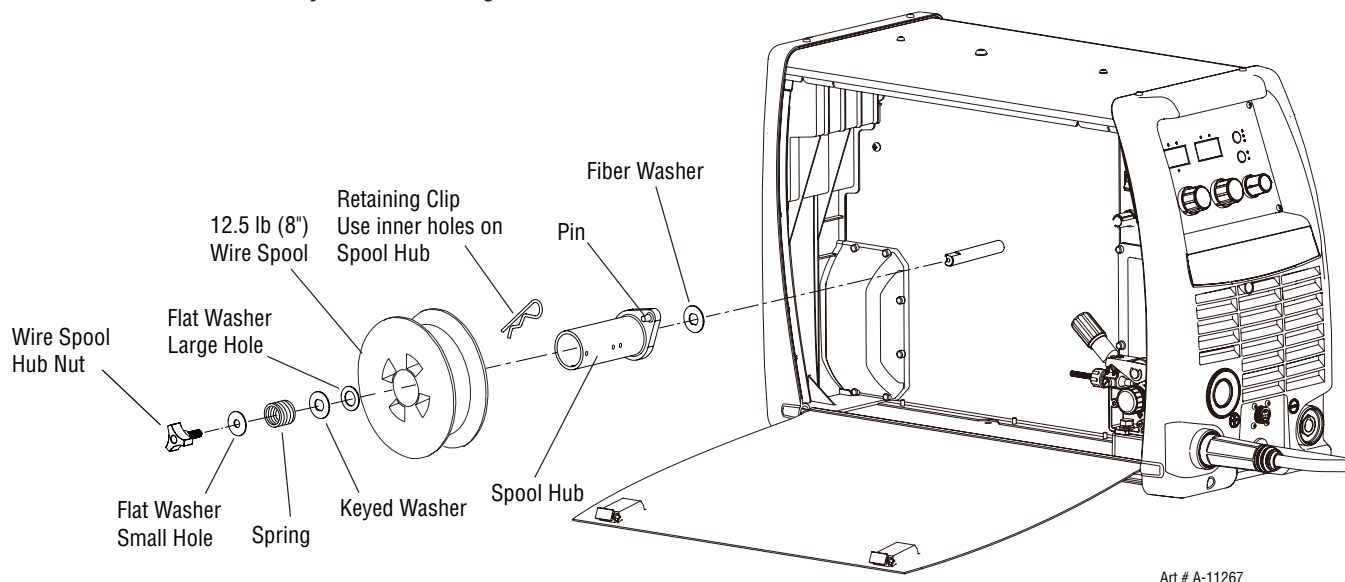


Figure 4-7: 12.5lb (8") Spool Installation



### 4.05 Installing 1 lb Spool (4" diameter)

In order to fit a 1 lb spool (4" diameter) assemble parts in the sequence shown in Figure 4-8.

Installation of wire spool:

1. Remove Wire Spool Hub Retaining Clip. Grasp the loop and pull.
2. Place Fiber Washer and Large Spring onto the Shaft, then load the Wire Spool on the Shaft so that the wire will feed off the bottom of the spool as spool rotates counter clockwise.
3. Then place Flat Washer Large Hole, Keyed Washer, Spring, Flat Washer Small Hole as shown in Figure 4-8. Finally secure with Wire Spool Hub Nut.

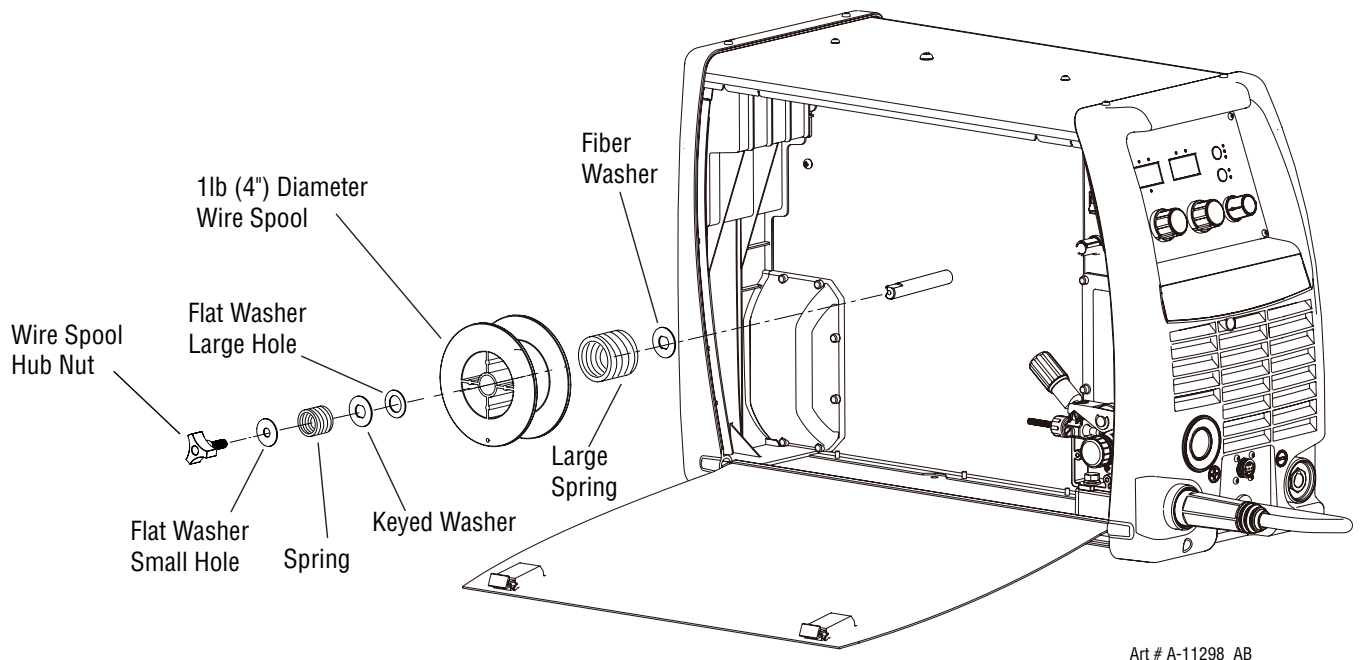
#### NOTE

*The Hub tension has been pre-adjusted at the factory. However if adjustment is required, refer to section 4.09.*



#### CAUTION

*Use care in handling the spooled wire as it will tend to "unravel" when loosened from the spool. Grasp the end of the wire firmly and don't let go of it.*



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Figure 4-8: 1lb (4") Spool Installation

## 4.06 Inserting Wire Into The Wire Feed Mechanism

Release the tension from the pressure arm by turning the adjustable wire drive tension knob in an anti-clockwise direction. Then push the tension knob toward the back of the machine to releases the pressue arm (Figure 4-9). With the MIG welding wire feeding from the bottom of the spool (Figure 4-10) pass the electrode wire through the inlet guide, between the rolls, through the outlet guide and into the MIG gun. Re-secure the pressue arm and wire drive tension knob and adjust the pressure accordingly (refer to Section 4.07). Remove the contact tip from the MIG gun. With the MIG gun lead reasonably straight, feed the wire through the MIG gun by depressing the trigger switch. Fit the appropriate contact tip.



### WARNING

*Before connecting the work clamp to the work make sure the Electricity Supply is switched off.*

*The electrode wire will be at welding voltage potential while it is being feed through the system.*

*Keep MIG gun away from eyes and face.*

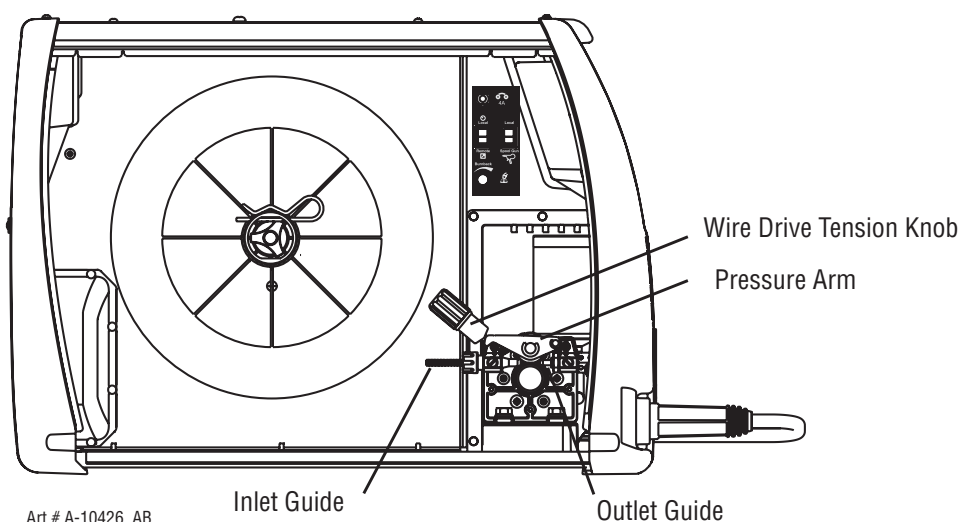


Figure 4-9: Wire Drive Assembly Components

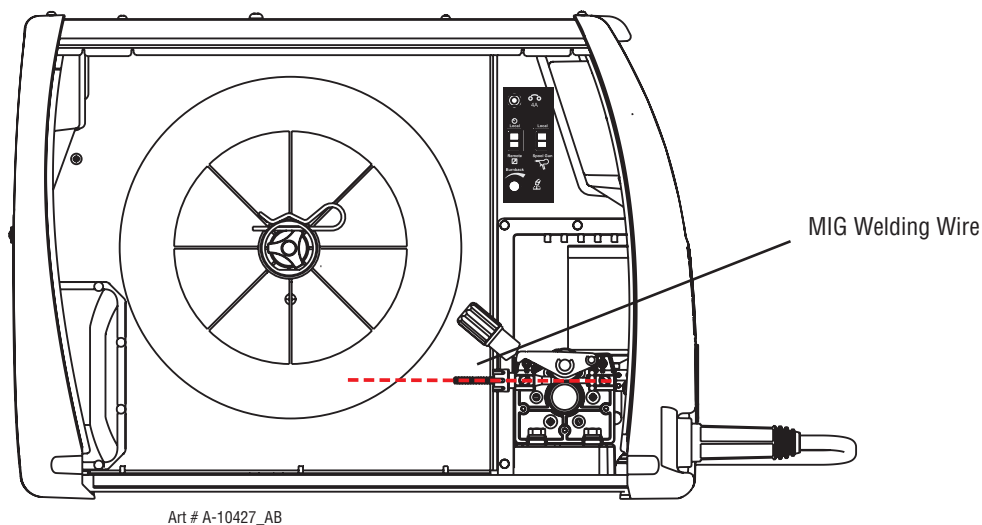


Figure 4-10: MIG Welding Wire - Installation

## 4.07 Feed Roll Pressure Adjustment

The pressure (top) roll applies pressure to the grooved feed roll via an adjustable pressure knob. These devices should be adjusted to a minimum pressure that will provide satisfactory WIREFEED without slippage. If slipping occurs, and inspection of the wire contact tip reveals no wear, distortion or burn back jam, the conduit liner should be checked for kinks and clogging by metal flakes and swarf. If it is not the cause of slipping, the feed roll pressure can be increased by rotating the pressure knob clockwise.



**WARNING**

*Before changing the feed roll ensure that the Electricity Supply to the power source is switched off.*



**CAUTION**

*The use of excessive pressure may cause rapid wear of the feed rolls, shafts and bearing.*

## 4.08 Changing the Feed Roll

To change feed roll remove the feed roll retaining screw by turning in an anticlockwise direction. Once the feed roll is removed then to replace feed roll simply reverse these directions.

### NOTE

*Be sure not to lose key that is located on Drive Motor Shaft. This key must align with drive roll groove for proper operation.*

A dual groove feed roll is supplied as standard. It can accommodate 0.6/0.8mm diameter hard wires. Select the roll required with the chosen wire size marking facing outward.

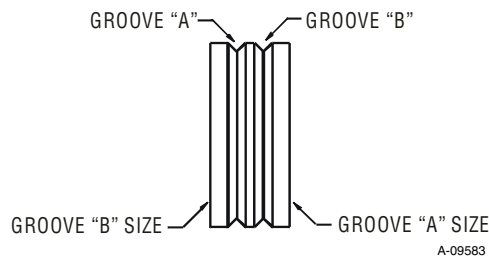
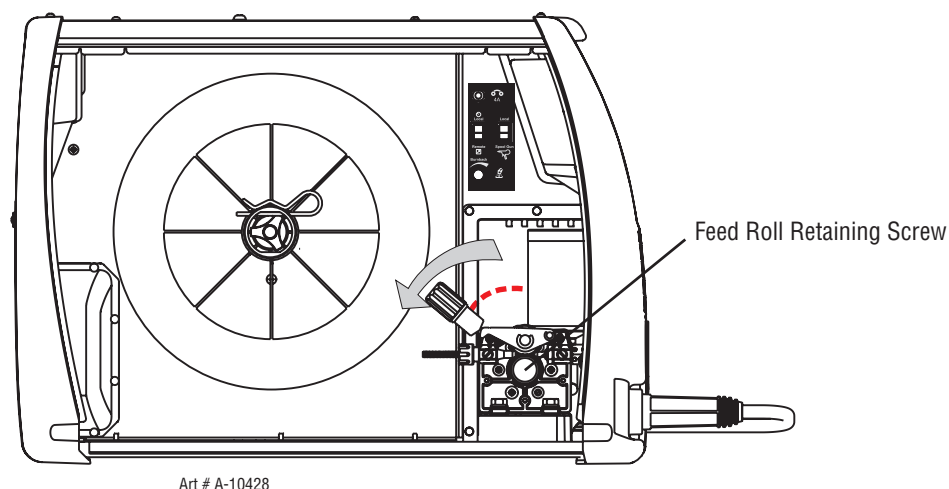


Figure 4-11: Dual Groove Feed Roll



Art # A-10428

Figure 4-12: Changing the Feed Roll

## 4.09 Wire Reel Brake

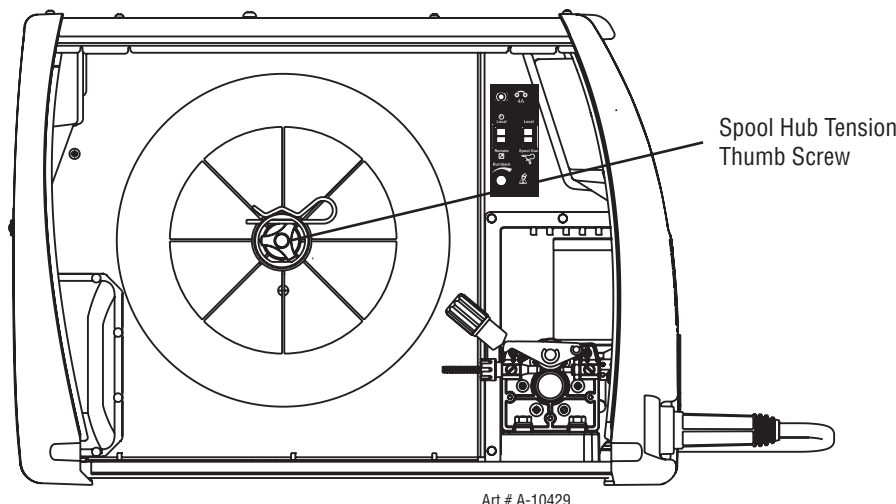
The wire reel hub incorporates a friction brake which is adjusted during manufacture for optimum braking.

If it is considered necessary, adjustment can be made by turning the Thumb Screw inside the open end of the hub clockwise to tighten the brake. Correct adjustment will result in the wire reel circumference continuing no further than 3 - 4mm (0.1"-0.15") after release of the trigger. The electrode wire should be slack without becoming dislodged from wire spool.



### CAUTION

*Overtension of brake will cause rapid wear of mechanical WIREFEED parts, overheating of electrical componentry and possibly an increased incidence of electrode wire Burnback into contact tip.*

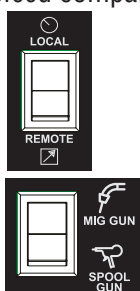


Art # A-10429

Figure 4-13: Wire Reel Brake

## 4.10 Setup For MIG (GMAW) Welding With Gas Shielded MIG Wire

- A. Select MIG mode with the process selection control. (refer to Section 4.01.13 for further information)
- B. Connect the MIG polarity lead to the positive welding terminal (+). If in doubt, consult the electrode wire manufacturer. Welding current flows from the Power Source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.
- C. Fit the MIG gun to the power source. (Refer to section 4.02 Attaching the TWECO Fusion 220A MIG gun).
- D. Connect the work lead to the negative welding terminal (-). If in doubt, consult the electrode wire manufacturer. Welding current flows from the Power Source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.
- E. Fit the welding grade shielding gas regulator/flowmeter to the shielding gas cylinder (refer to Section 3.08) then connect the shielding gas hose from the rear of the power source to the regulator/flowmeter outlet.
- F. Refer to the Weld Guide located on the inside of the wirefeed compartment door for further information.
- G. Switch the LOCAL/REMOTE switch inside the wire feed compartment to LOCAL to use the Power Sources Wirespeed and Voltage controls.
- H. Switch the MIG GUN/SPOOL GUN switch inside the wire feed compartment to MIG GUN.





**WARNING**

*Before connecting the work clamp to the work make sure the Electricity Supply is switched off.*

*Secure the welding grade shielding gas cylinder in an upright position by chaining it to a suitable stationary support to prevent falling or tipping.*



**CAUTION**

*Loose welding terminal connections can cause overheating and result in the male plug being fused in the terminal.*

*Remove any packaging material prior to use. Do not block the air vents at the front or rear of the Welding Power Source.*

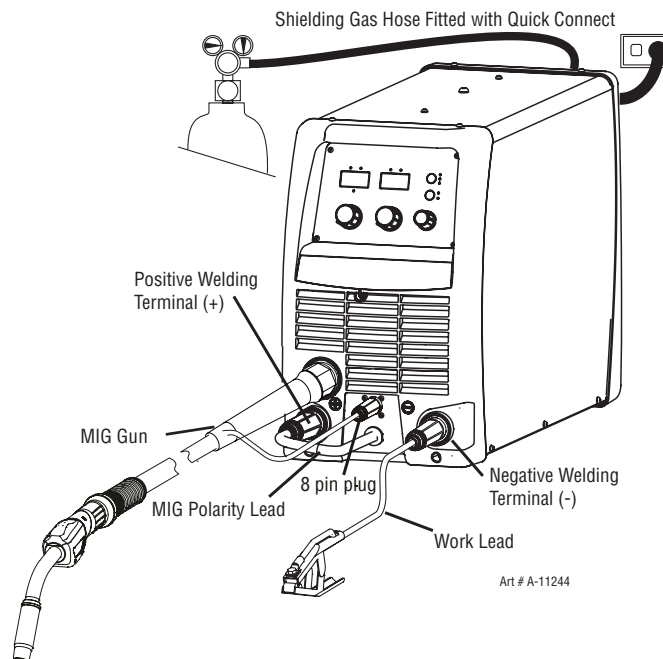


Figure 4-14: Setup for MIG Welding with Gas Shielded MIG Wire

## 4.11 Setup For MIG (FCAW) Welding With Flux Core (Gasless) Wire

- Select MIG mode with the process selection control (refer to Section 4.01.13 for further information).
- Connect the MIG polarity lead to the negative welding terminal (-). If in doubt, consult the electrode wire manufacturer. Welding current flows from the power source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.
- Connect the work lead to the positive welding terminal (+). If in doubt, consult the electrode wire manufacturer. Welding current flows from the power source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.
- Refer to the Weld Guide located on the inside of the wirefeed compartment door for further information.

- E. Switch the LOCAL/REMOTE switch inside the wire feed compartment to LOCAL to use the Power Sources Wirespeed and Voltage controls.



- F. Switch the MIG GUN/SPOOL GUN switch inside the wire feed compartment to MIG GUN.

**WARNING**

*Before connecting the work clamp to the work make sure the Electricity Supply is switched off.*

**CAUTION**

*Loose welding terminal connections can cause overheating and result in the male plug being fused in the terminal.*

*Remove any packaging material prior to use. Do not block the air vents at the front or rear of the Welding Power Source.*

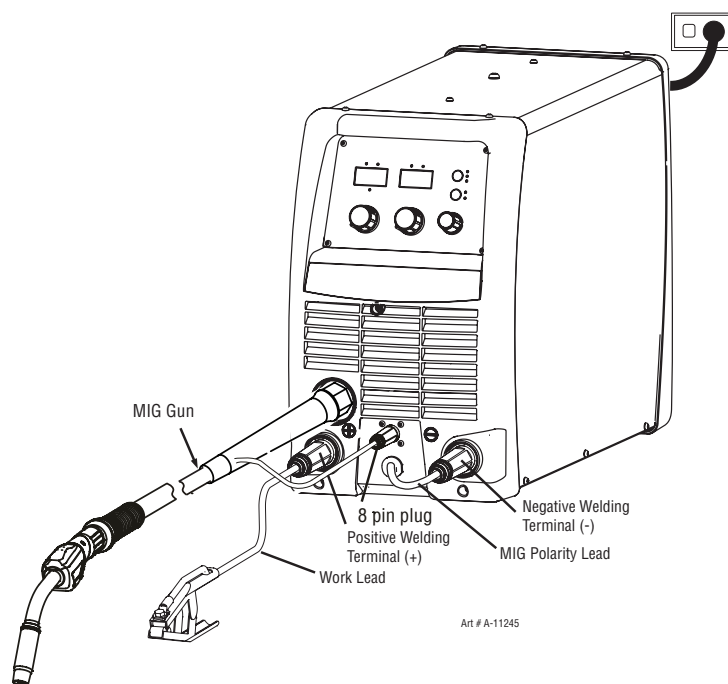


Figure 4-15: Setup for MIG Welding with Gasless MIG Wire

## 4.12 Setup For SPOOL GUN MIG (GMAW) Welding With Gas Shielded MIG Wire

Select MIG mode with the **Process Selection Control**.

For setup and operation of the spool gun, please refer to the spool gun operations manual.

Switch the MIG GUN/SPOOL GUN switch inside the wire feed compartment to SPOOL GUN.



Connect the shielding gas for the to the Shielding Gas Inlet on the rear panel of the Power Source.

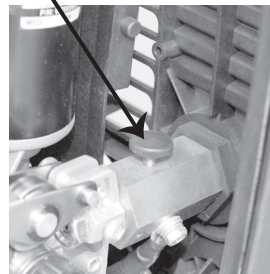
1. Make sure the welding power source is turned OFF before connecting the welding gun.



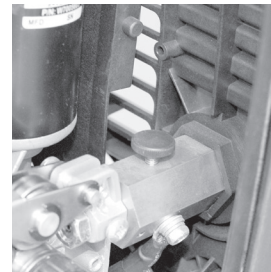
Art # A-11629

Thumb screw

2. Open side panel and loosen thumb screw.
3. Insert the back end of the Spool gun into the gun receiving bushing.



4. Tighten thumb screw and replace side panel.



5. Connect gas supply fitting and tighten with a wrench.
6. Align Control Plug to panel fitting and tighten securely.



**WARNING**

*Before connecting the work clamp to the work make sure the main power supply is switched off.*

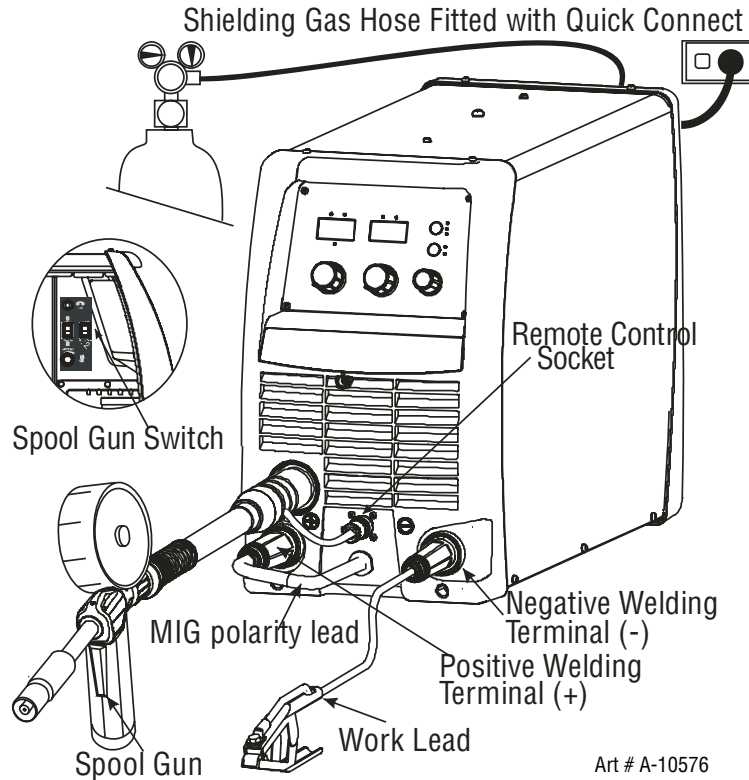
*Secure the welding grade shielding gas cylinder in an upright position by chaining it to a suitable stationary support to prevent falling or tipping.*



**CAUTION**

*Loose welding terminal connections can cause overheating and result in the male plug being fused in the terminal.*

*Remove any packing material prior to use. Do not block the air vents at the front or rear of the Welding Power Source.*



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Figure 4-16: Setup for Spool Gun Welding with Gas Shielded MIG Wire

### 4.13 Setup For LIFT TIG (GTAW) Welding

- A. Select LIFT TIG mode with the process selection control (refer to Section 4.01.13 for further information).
- B. Connect the TIG Torch to the negative welding terminal (-). Welding current flows from the power source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.
- C. Connect the work lead to the positive welding terminal (+). Welding current flows from the Power Source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.
- D. Connect the TIG torch trigger switch via the 8 pin socket located on the front of the power source as shown below. The TIG torch will require a trigger switch to operate in LIFT TIG Mode.

**NOTE**

*A Thermal Arc 26V TIG torch with an 8 pin plug must be used to turn the weld current on/off via the TIG torch trigger switch to TIG weld OR a Thermal Arc Foot Control with an 8 pin plug must be used to turn the weld current on/off as well as providing remote control of the weld current.*

- E. Fit the welding grade shielding gas regulator/flowmeter to the shielding gas cylinder (refer to Section 3.08) then connect the shielding gas hose from the TIG torch to the regulator/flowmeter outlet. Note that the TIG torch shielding gas hose is connected directly to the regulator/flowmeter. The power source is not fitted with a shielding gas solenoid to control the gas flow in LIFT TIG mode therefore the TIG torch will require a gas valve.



**WARNING**

*Before connecting the work clamp to the work and inserting the electrode in the TIG Torch make sure the Electricity Supply is switched off.*

*Secure the welding grade shielding gas cylinder in an upright position by chaining it to a stationary support to prevent falling or tipping.*



**CAUTION**

*Remove any packaging material prior to use. Do not block the air vents at the front or rear of the Welding Power Source.*

*Loose welding terminal connections can cause overheating and result in the male plug being fused in the terminal.*

- F. Switch the LOCAL/REMOTE switch inside the wire feed compartment to LOCAL to use the Power Sources Amperage control or REMOTE for remote amperage using a Foot Control.

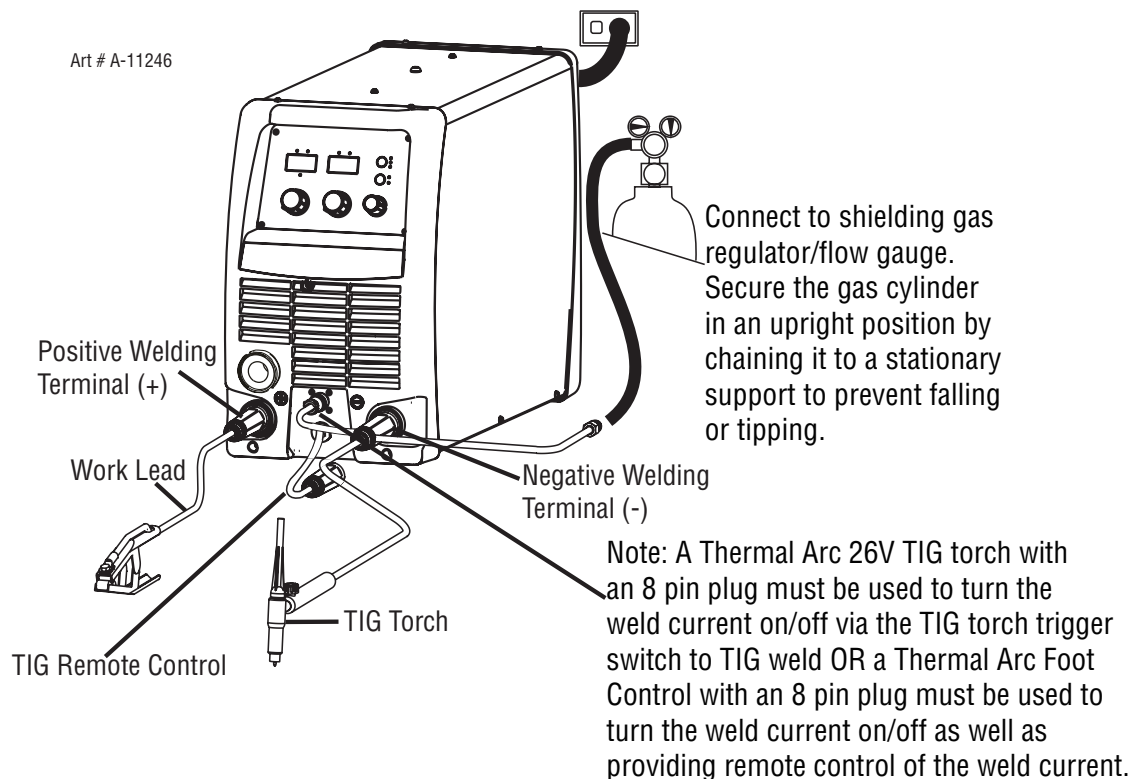


Figure 4-17: Setup for TIG Welding

## 4.14 Setup For STICK (SMAW) Welding

- Connect the Electrode Holder lead to the positive welding terminal (+). If in doubt, consult the electrode manufacturer. Welding current flows from the Power Source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.
- Connect the work lead to the negative welding terminal (-). If in doubt, consult the electrode manufacturer. Welding current flows from the power source via heavy duty bayonet type terminals. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection.
- Select STICK mode with the process selection control (refer to Section 4.01.13 for further information).



### WARNING

*Before connecting the work clamp to the work and inserting the electrode in the electrode holder make sure the Electricity Supply is switched off.*



### CAUTION

*Remove any packaging material prior to use. Do not block the air vents at the front or rear of the Welding Power Source.*

- Switch the LOCAL/REMOTE switch inside the wire feed compartment to LOCAL to use the Power Sources Amperage control or REMOTE for remote amperage control using a Hand Pendant Control.

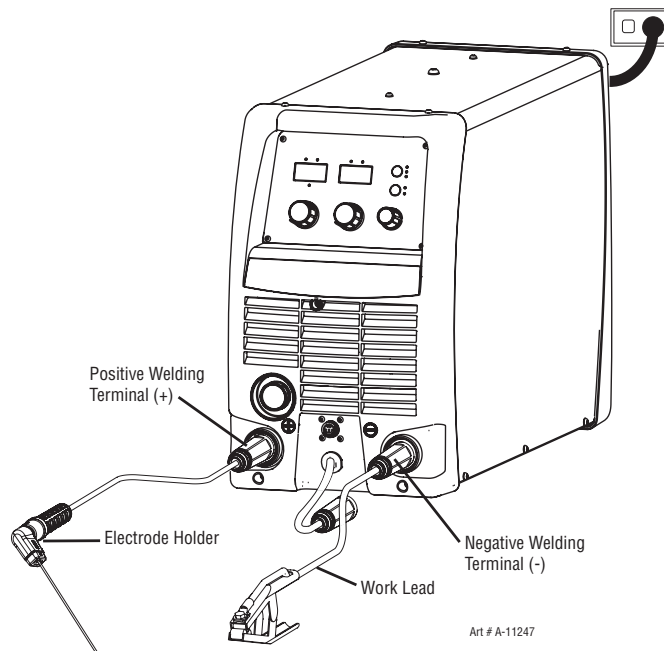


Figure 4-18: Setup for Manual Arc Welding.

## SECTION 5: TROUBLESHOOTING

### 5.01 Basic Troubleshooting-Power Source Faults

#### NOTE

*In the table below, words "Faulty Power PCB, Control PCB or Display PCB" will appear, refer to relative sections to detect and confirm the fault.*

*Refer to Section 5.06, 5.08, 5.09 and 5.10/Item 1/Power PCB to detect whether the Power PCB is defective.*

*Refer to Section 5.07, 5.10/Item 4/Control PCB and 5.11 to detect whether the Control PCB is defective.*

*Refer to Section 5.10/Item 3/ Display PCB to detect whether the Display PCB is defective..*

*If Power PCB, Control PCB or Display PCB is broken, replace accordingly.*

Fault		Possible Cause		Remedy	
1	There is no weld output and all front panel displays are off	A B C D E F G	The main Power Switch is set to OFF Line fuse is blown The main Power Switch is faulty Loose connection Faulty Power PCB Faulty Control PCB Faulty Display PCB	A B C D E F G	Set main Power Switch to ON Replace Line fuse Replace main Power Switch Tighten connections Replace Power PCB Replace Control PCB Replace Display PCB
2	There is no weld output and all front panel displays are off or flickering on & off	A	The internal protection circuit to shut the unit down if the mains supply voltage is too high has operated	A	Check to see if mains supply voltage is <274VAC. A generator with poor voltage regulation may cause a supply voltage in excess of 274VAC. Connect Power Source to a supply voltage <274VAC.
3	There is no weld output and the yellow over temperature light is on	A B C	Unit has overheated Airflow inlet or outlet ducts are blocked Fan does not operate	A B C	Allow unit to cool with fan running until over temperature light extinguishes Remove blockages from airflow ducts Replace fan. Check fan wiring header is plugged securely into Control PCB. Check fan wiring for damage.
4	Mode switch does not change welding mode	A	Faulty Display PCB	A	Replace Display PCB
5	The wirefeed motor and the weld output do not operate when the torch trigger switch is depressed	A B C D E F G H	Internal wiring fault Over temperature light is on Power Source set to REMOTE Trigger wires shorted to weld voltage inside torch Trigger wires or torch switch faulty Faulty Power PCB Faulty Control PCB Faulty Display PCB	A B C D E F G H	Check continuity of internal wiring from Torch adaptor through to boards Allow unit to cool Set switch to LOCAL Repair trigger wires in torch Check & Repair Replace Power PCB Replace Control PCB Replace Display PCB

6	The wirefeed motor does not operate when the torch trigger switch is depressed	A B C D	Power Source set to TIG or STICK mode Wirefeeder motor wiring has become loose Trigger wires or torch switch faulty Faulty Power PCB	A B C D	Set power Source to MIG mode Check motor wiring Check & Repair Replace trigger switch/wire Replace Power PCB
7	The wirefeed motor operates at maximum speed and cannot be adjusted.	A B	Faulty Power PCB Faulty Display PCB	A B	Replace Power PCB Replace Display PCB
8	Wirefeed motor operates when the torch trigger switch is depressed but the gas valve does not operate.	A B C D E	Internal wiring fault Faulty Solenoid Debris in gas system causing solenoid to stay open or closed Faulty Power PCB Faulty Control PCB	A B C D E	Check solenoid wiring header is plugged securely into Control PCB. Check solenoid wiring is not damaged Replace Solenoid Clean out gas system. Disassemble solenoid & clean out debris Replace Power PCB Replace Control PCB
9	A welding arc can be established but the weld is erratic or inconsistent	A B C D E F G H	Work Lead cable too small Loose welding connections Loose work clamp Incorrect weld polarity selected No shielding gas Wind blows shielding gas away Incorrect TIG tungsten electrode Poorly prepared or worn TIG tungsten	A B C D E F G H	Use correct weld cable size Tighten welding connections Tighten work clamp Correct weld polarity. Refer to weld consumable manufacturers recommended polarity Connect shielding gas Shield welding area from drafts Use correct tungsten type Regrind tungsten to correct shape

Table 5-1 Power Source Faults

## 5.02 Routine Service and Calibration Requirements



### WARNING

*There are extremely dangerous voltage and power levels present inside this Inverter Power Source. Do not attempt to open or repair unless you are an accredited Thermal Arc Service Provider. Disconnect the Welding Power Source from the Mains Supply Voltage before disassembling.*

### Routine Inspection, Testing & Maintenance

The inspection and testing of the power source and associated accessories shall be carried out by a licensed electrician. This includes an insulation resistance test and an earthing test to ensure the integrity of the unit is compliant with Thermal Arc's original specifications.

#### A. Testing Schedule

1. For transportable equipment, at least once every 3 months; and

2. For fixed equipment, at least once every 12 months.

The owners of the equipment shall keep a suitable record of the periodic tests and a system of tagging, including the date of the most recent inspection.

A transportable power source is deemed to be any equipment that is not permanently connected and fixed in the position in which it is operated.

#### **NOTE**

*Please refer to local guidelines for further information.*

### **B. Insulation Resistance**

Minimum insulation resistance for in-service Thermal Arc Inverter Power Sources shall be measured at a voltage of 500V between the parts referred to in Table 5-2 below. Power sources that do not meet the insulation resistance requirements set out below shall be withdrawn from service and not returned until repairs have been performed such that the requirements outlined below are met.

Components to be Tested	Minimum Insulation Resistance (M $\Omega$ )
Input circuit (including any connected control circuits) to welding circuit (including any connected control circuits)	5
All circuits to exposed conductive parts	2.5
Welding circuit (including any connected control circuits) to any auxiliary circuit which operates at a voltage exceeding extra low voltage	10
Welding circuit (including any connected control circuits) to any auxiliary circuit which operates at a voltage not exceeding extra low voltage	1
Separate welding circuit to separate welding circuit	1

Table 5-2 Minimum Insulation Resistance Requirements: Thermal Arc Inverter Power Sources

### **C. Earthing**

The resistance shall not exceed 1 $\Omega$  between any metal of a power source where such metal is required to be earthed, and -

1. The earth terminal of a fixed power source; or
2. The earth terminal of the associated plug of a transportable power source

Note that due to the dangers of stray output currents damaging fixed wiring, the integrity of fixed wiring supplying Thermal Arc welding power sources should be inspected by a licensed electrical worker in accordance with the requirements below -

1. For outlets/wiring and associated accessories supplying transportable equipment - at least once every 3 months; and
2. For outlets/wiring and associated accessories supplying fixed equipment - at least once every 12 months.

### **D. General Maintenance Checks**

Welding equipment should be regularly checked by an accredited Thermal Arc Service Provider to ensure that:

1. Flexible cord is of the multi-core tough rubber or plastic sheathed type of adequate rating, correctly connected and in good condition.
2. Welding terminals are in suitable condition and are shrouded to prevent inadvertent contact or short circuit.
3. The Welding System is clean internally, especially from metal filing, slag, and loose material.

E. Accessories

Accessory equipment, including output leads, electrode holders, torches, wire feeders and the like shall be inspected at least monthly by a competent person to ensure that the equipment is in a safe and serviceable condition. All unsafe accessories shall not be used.

F. Repairs

If any parts are damaged for any reason, it is recommended that replacement be performed by an accredited Thermal Arc Service Provider.

Power Source Calibration

A. Schedule

Output testing of all Thermal Arc Inverter Power Sources and applicable accessories shall be conducted at regular intervals to ensure they fall within specified levels. Calibration intervals shall be as outlined below -

- 1. For transportable equipment, at least once every 3 months; and
- 2. For fixed equipment, at least once every 12 months.

If equipment is to be used in a hazardous location or environments with a high risk of electrocution as outlined in EN 60974-1, then the above tests should be carried out prior to entering this location.

B. Calibration Requirements

Where applicable, the tests outlined in Table 5-3 below shall be conducted by an accredited Thermal Arc service agent.

Testing Requirements
Output current (A) to be checked to ensure it falls within applicable Thermal Arc power source specifications
Output Voltage (V) to be checked to ensure it falls within applicable Thermal Arc power source specifications
Motor Speed (RPM) of wire drive motors to be checked to ensure it falls within required Thermal Arc power source / wire feeder specifications
Accuracy of digital meters to be checked to ensure it falls within applicable Thermal Arc power source specifications

Table 5-3 Calibration Parameters

Periodic calibration of other parameters such as timing functions are not required unless a specific fault has been identified.

C. Calibration Equipment

All equipment used for Power Source calibration shall be in proper working condition and be suitable for conducting the measurement in question. Only test equipment with valid calibration certificates (NATA certified laboratories) shall be utilized.

5.03 Check Unit before Applying Power

If the problem cannot be solved by the basic (external) troubleshooting guide, the Power Source cover will have to be removed to allow the technician to analyse failures with a few common tools.




WARNING


Turn off power and disconnect mains supply plug from receptacle before working on the unit. Allow two minutes for capacitors to discharge after disconnection from mains supply voltage.




## Checking Unit Before Applying Power



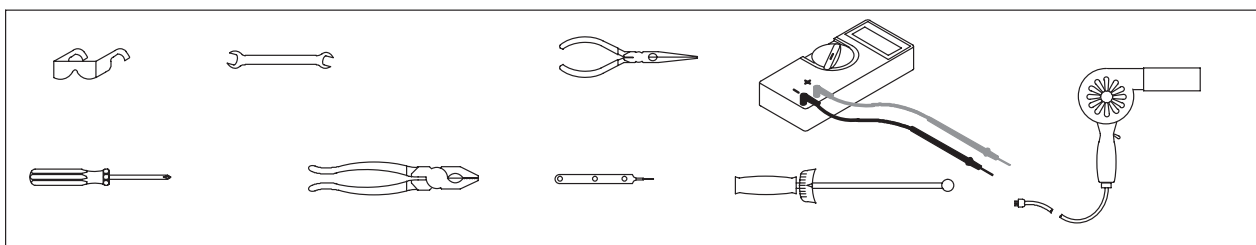
 Turn SW1 to OFF position, and disconnect unit from primary line voltage before working on unit.

 Significant DC voltage can remain on capacitors after unit is Off. Wait until all front panel LED's are off before removing case.

 Check DC bus voltage according to Section 5.06 after removing case.

 Before troubleshooting or applying power to unit, complete the following checks to avoid causing further damage.

## 5.04 Test Equipment and Tools Needed for Troubleshooting and Servicing



Art # A-09849

- Digital Multimeter
- DC clip-on ammeter
- Screwdriver and spanner
- Oscilloscope & isolating transformer

## 5.05 Visually Inspect

Visually inspect the inside of the Power Source. The levels of current present in these units can cause burning or arcing of PCB, transformers, switches, or rectifier when a failure occurs. Carefully inspect all components within these units.

Look in particular for the following:

- a) Loose or broken wires or connectors.
- b) Burned or scorched parts or wires or evidence of arcing.
- c) Any accumulation of metal dust or filings that may have caused shorting or arcing.

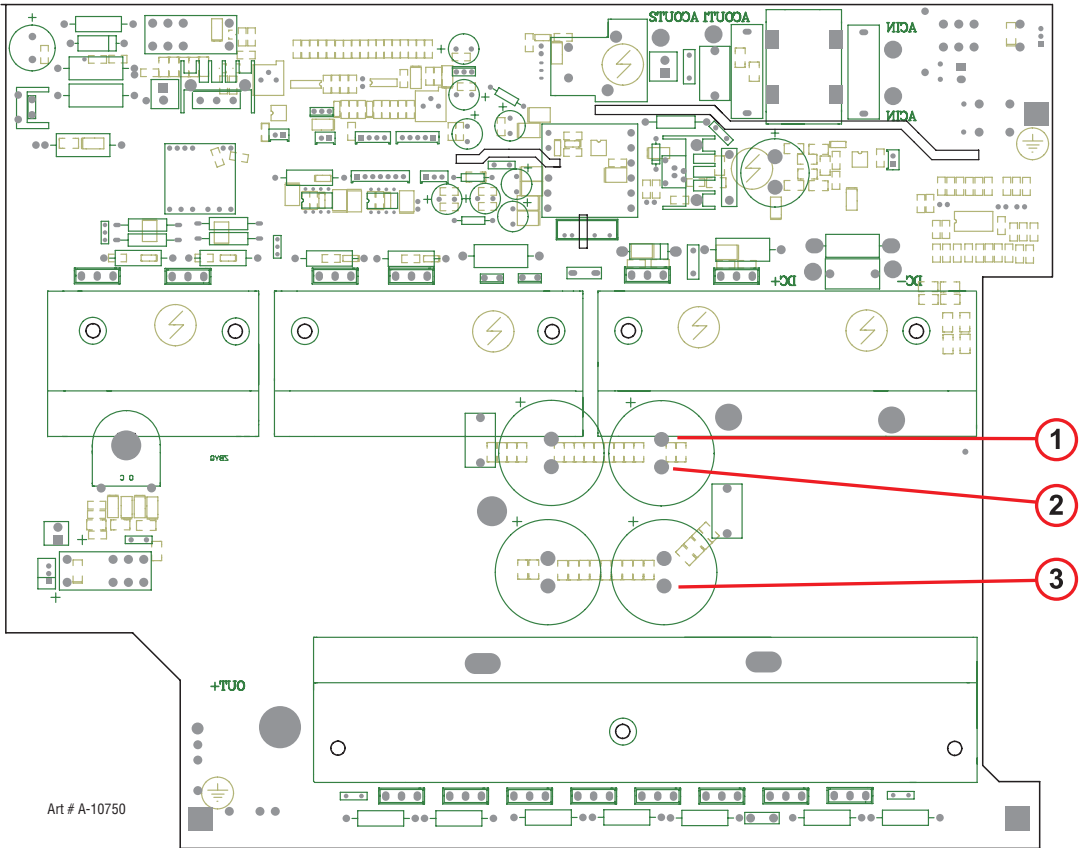
If any parts are damaged, they must be replaced. Refer to the Spare Parts section for a complete list of components used in the Power Source.

Locate the faulty component(s) then replace where necessary.

5.06 Preliminary DC Bus Measurement of the Power PCB



Check DC bus voltage has discharged to less than 5VDC before servicing. Ensure the mains supply plug is disconnected from receptacle.

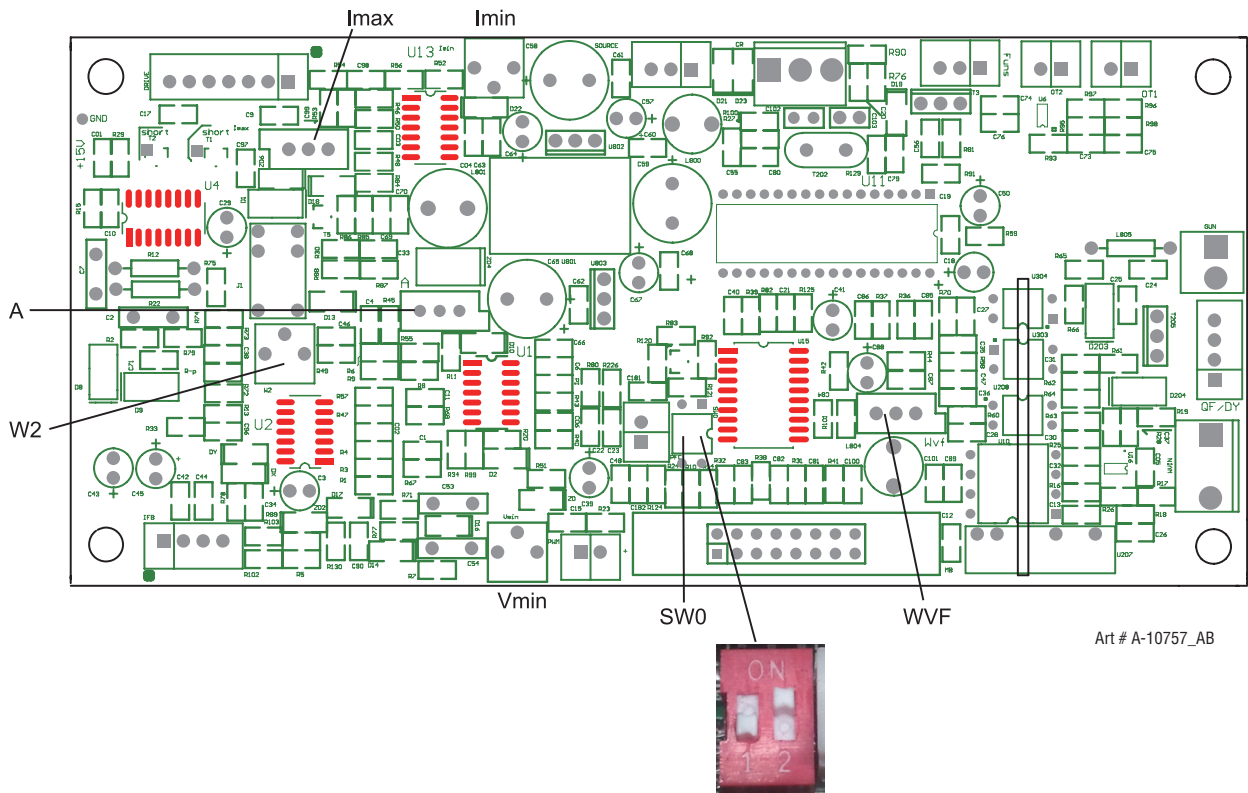


DC Bus Testing	Multimeter Lead Placement	Voltage with Supply Voltage OFF
Upper capacitor bank	Positive meter lead to testpoint 1 Negative meter lead to testpoint 2	0 VDC
Lower capacitor bank	Positive meter lead to testpoint 2 Negative meter lead to testpoint 3	0 VDC

Table 5-4 DC BUS, Multimeter set to measure DC volts

5.07 Preliminary Check of the Control PCB

 Read and follow safety information in Section 5.03 before proceeding.



IGBT Testing	Multimeter Lead Placement	Diode Voltage
IGBT V8 & V8-1	Positive meter lead to testpoint 3 Negative meter lead to testpoint 4	0.2 – 0.8 VDC
IGBT T1 & T2	Positive meter lead to testpoint 6 Negative meter lead to testpoint 5	0.2 – 0.8 VDC
IGBT T4 & T5	Positive meter lead to testpoint 3 Negative meter lead to testpoint 7	0.2 – 0.8 VDC

Table 5-5 IGBT's, Multimeter set to measure Diode Voltage

IGBT Testing	Multimeter Lead Placement	Ohms
IGBT V8 & V8-1	Positive meter lead to testpoint 4 Negative meter lead to testpoint 3	>150 Ω
IGBT T1 & T2	Positive meter lead to testpoint 5 Negative meter lead to testpoint 6	>150 Ω
IGBT T4 & T5	Positive meter lead to testpoint 7 Negative meter lead to testpoint 3	>150 Ω

Table 5-6 IGBT's, Multimeter set to measure ohms (Ω)

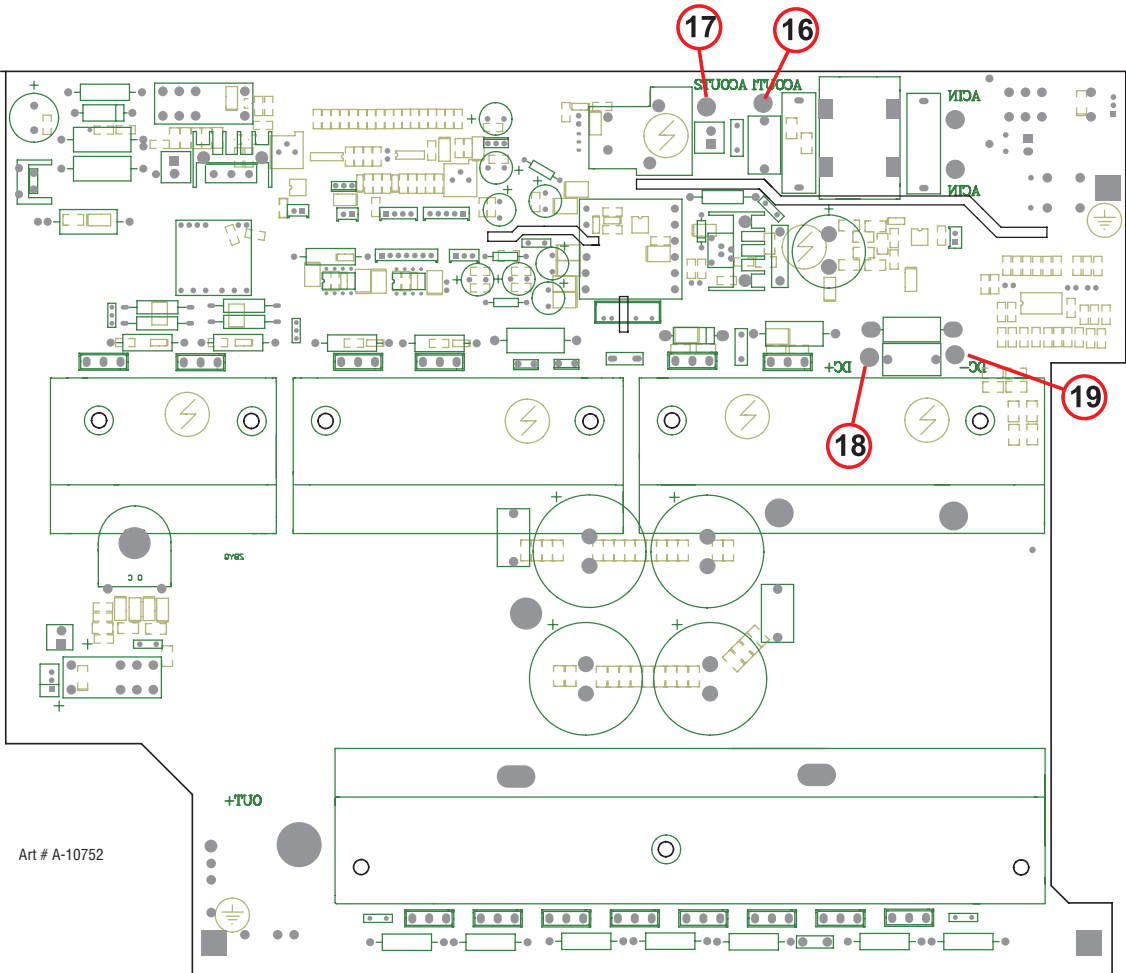
Inrush Resistor	Multimeter Lead Placement	Ohms
Resistor	Positive meter lead to testpoint 8 Negative meter lead to testpoint 9	3 Ω

Table 5-7 Inrush PTC, Multimeter set to measure ohms (Ω)

DIODE Testing	Multimeter Lead Placement	Diode Voltage
DIODE V7 & V7-1	Positive meter lead to testpoint 10 Negative meter lead to testpoint 11	0.2 – 0.8 VDC
DIODE T18, T19, T20, T21	Positive meter lead to testpoint 12 Negative meter lead to testpoint 13	0.2 – 0.8 VDC
DIODE T14, T15, T16, T17	Positive meter lead to testpoint 14 Negative meter lead to testpoint 15	0.2 – 0.8 VDC

Table 5-8 Diodes, Multimeter set to measure Diode Voltage

5.08 Check Main Input Rectifier




Input Rectifier Testing	Multimeter Lead Placement	Diode Voltage
AC1 to DC+	Positive meter lead to 16 Negative meter lead to testpoint 18	0.2 – 0.8 VDC
AC2 to DC+	Positive meter lead to 17 Negative meter lead to testpoint 18	0.2 – 0.8 VDC
AC1 to DC-	Positive meter lead to testpoint 19 Negative meter lead to testpoint 16	0.2 – 0.8 VDC
AC2 to DC-	Positive meter lead to testpoint 19 Negative meter lead to testpoint 17	0.2 – 0.8 VDC

Table 5-9 Input Rectifier, Multimeter set to measure Diode Voltage

Measurements may be made directly onto the main input rectifier. AC1 and AC2 may be measured from the pins on the mains supply plug with the main power switch set to the ON position.

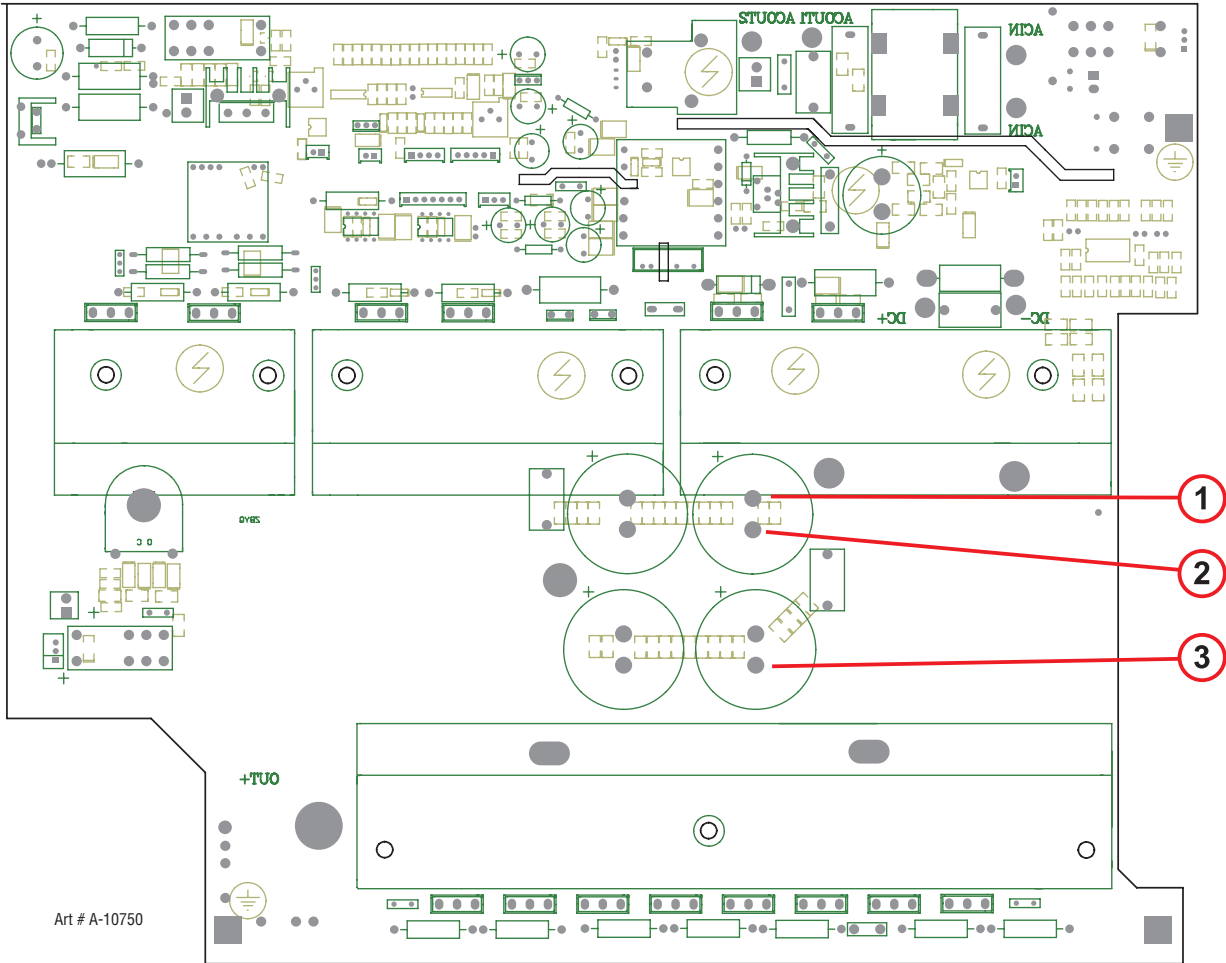
5.09 DC Bus Voltage Measurement

Apply voltage to the Power Source.

 There are extremely dangerous voltage and power levels present inside these Power Sources. Do not attempt to diagnose or repair unless you have had training in power electronics measurement and troubleshooting techniques.

Once power is applied to the Power Source, there are extremely hazardous voltage and power levels present.

Do not touch any live parts.



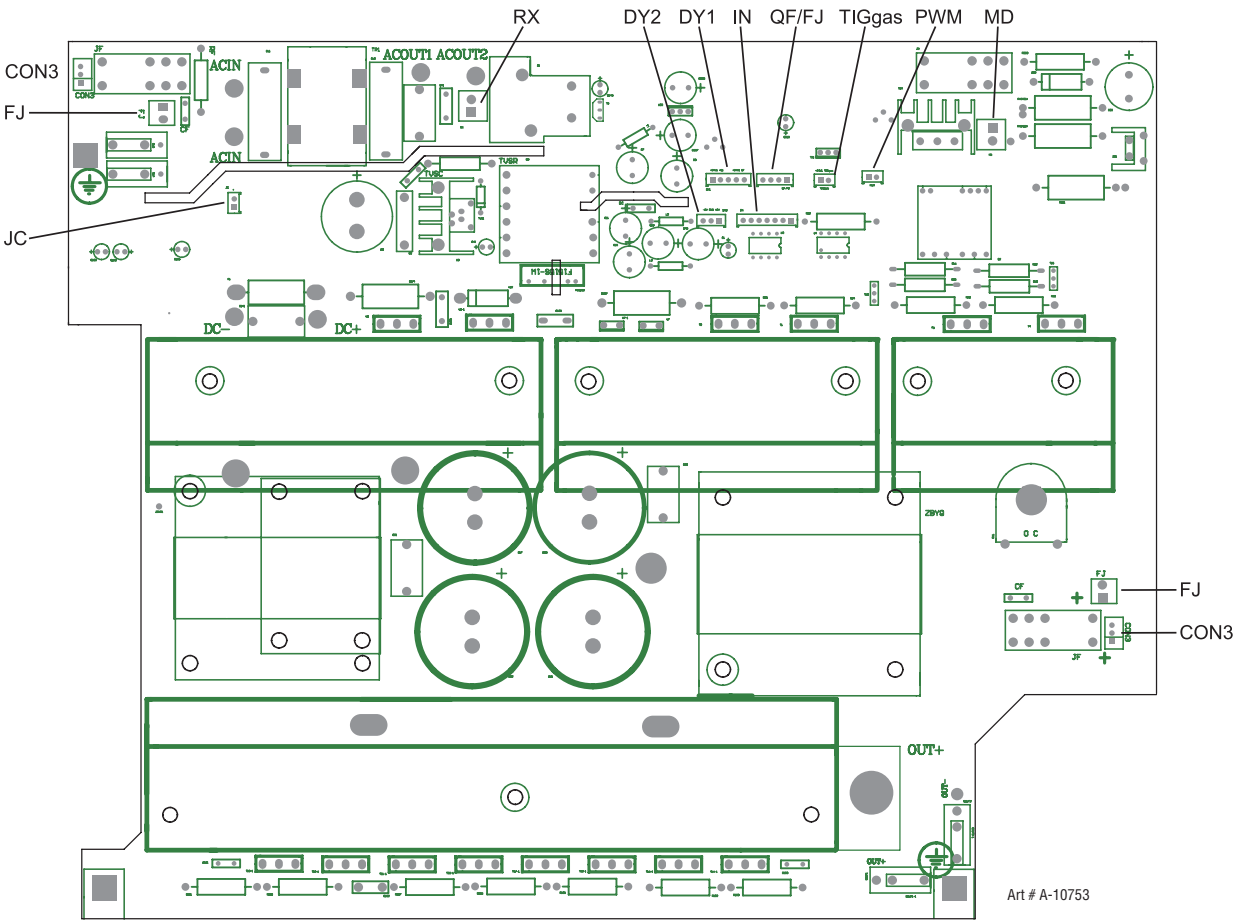
DC Bus Testing	Multimeter Lead Placement	Voltage with Supply Voltage ON
Upper capacitor bank	Positive meter lead to testpoint 1 Negative meter lead to testpoint 2	190 VDC +/-10%
Lower capacitor bank	Positive meter lead to testpoint 2 Negative meter lead to testpoint 3	190 VDC +/-10%
Overall capacitor bank	Positive meter lead to testpoint 1 Negative meter lead to testpoint 3	385 VDC +/-10%

Table 5-10 DC BUS, Multimeter set to measure DC volts

Note: These DC voltages are at nominal mains supply voltage of 240VAC/110VAC.

5.10 PCB Connectors

1 Power PCB



IN Header Pin	Pin function	Signal
1	+15V	15 VDC
2	IGBT 1 pwm drive signal, 15V p-p square wave	15 VDC pk
3	IGBT 2 pwm drive signal, 15V p-p square wave	15 VDC pk
4	IGBT 2 pwm drive signal, 15V p-p square wave	15 VDC pk
5	IGBT 1 pwm drive signal, 15V p-p square wave	15 VDC pk
6	Rectified secondary of current transformer TR8	15 VDC pk
7	0V	0 VDC

Table 5-11 IN Header pin function (connects to DRIVE header on control PCB)

PWM Header Pin	Pin function	Signal
1	0VDC	0 VDC
2	Motor pwm drive signal	5 VDC pk

Table 5-12 PWM Header pin function (connects to PWM header on control PCB)

MD Header Pin	Pin function	Signal
1	Motor positive	24 VDC
2	Motor negative	0 VDC

Table 5-13 MD Header pin function (connects to MT-IN header on motor PCB)

DY2 Header Pin	Pin function	Signal
1	+24V	24 VDC
2	0V	0 VDC
3	-24V	-24 VDC

Table 5-14 DY2 Header pin function (connects to SOURCE header on control PCB)

DY1 Header Pin	Pin function	Signal
1	+24V (solenoid positive)	24 VDC
2	0V	0V
3	No connection	n/c
4	+24V (solenoid positive)	24 VDC
5	Solenoid negative	0 VDC

Table 5-15 DY1 Header pin function

QF/FJ Header Pin	Pin function	Signal
1	+24V (VRD positive)	24 VDC
2	Solenoid negative	0 VDC
3	+24V (solenoid positive)	24 VDC
4	0V	0 VDC

Table 5-16 QF/FJ Header pin function (Connects to QF/DY header on control PCB)

RX Header Pin	Pin function	Signal
1	Inrush Resistor	
2	Inrush Resistor	

Table 5-17 RX Header pin function (connects to Inrush Resistor)

JC Header Pin	Pin function	Signal
1	+5V	+5 VDC
2	PFC OK signal, 5V = PFC OK	

Table 5-18 JC Header pin function (connects to PFC header on control PCB)

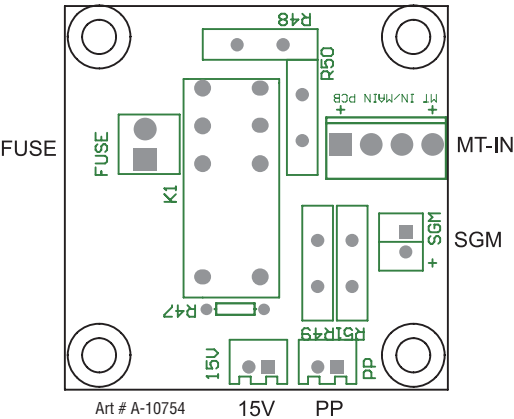
FJ Header Pin	Pin function	Signal
1	Fan positive	+24 VDC
2	Fan negative	0 VDC

Table 5-19 FJ Header pin function (connects to FAN)

CON3 Header Pin	Pin function	Signal
1	24VDC	+24 VDC
2		
3	Fan control signal, 0V = Fan ON	0VDC

Table 5-20 CON3 Header pin function (connects to FUNs on control PCB)





MT-IN Header Pin	Pin function	Signal
1	Motor positive from Power PCB	24 VDC
2	Motor negative from Power PCB	0 VDC
3	Motor negative	0 VDC
4	Motor positive	24 VDC

Table 5-21 MT-IN Header pin function (Connects to MD header on Power PCB & to Motor)

SGM Header Pin	Pin function	Signal
1	Spool Gun Motor negative	0 VDC
2	Spool Gun Motor positive	24 VDC

Table 5-22 SG-M Header pin function (connects to SGM header on display PCB)

PP Header Pin	Pin function	Signal
1	Spool Gun Switch	
2	Spool Gun Switch	

Table 5-23 PP Header pin function (connects to Spool Gun Switch)

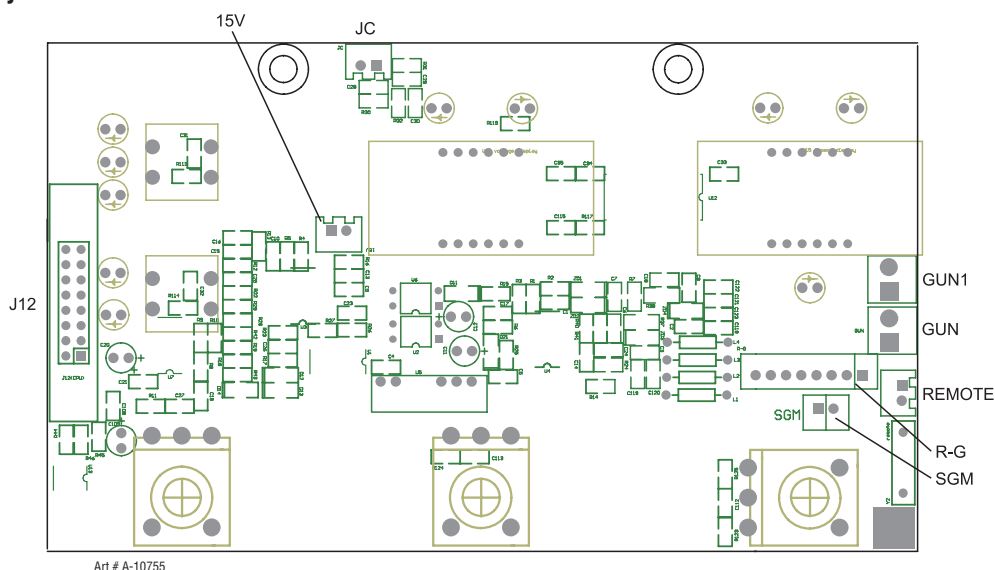
15V Header Pin	Pin function	Signal
1	0VDC	0 VDC
2	15VDC	15 VDC

Table 5-24 15V Header pin function (connects to 15V header on display PCB)

FUSE Header Pin	Pin function	Signal
1	Circuit Breaker	
2	Circuit Breaker	

Table 5-25 FUSE Header pin function (connects to Motor Circuit Breaker)

## 3 Display PCB



GUN Header Pin	Pin function	Signal
1	+24V trigger positive (0V when trigger closed)	24 VDC
2	0VDC	0 VDC

Table 5-26 GUN Header pin function (connects to GUN header on control PCB)

GUN1 Header Pin	Pin function	Signal
1	+24V trigger positive (0V when trigger closed)	24 VDC
2	0VDC	0 VDC

Table 5-27 GUN Header pin function (connects to front panel torch trigger terminals)

REMOTE Header Pin	Pin function	Signal
1	Remote switch	
2	Remote switch	

Table 5-28 REMOTE Header pin function (connects to remote switch)

J12 Header Pin	Pin function	Signal
1	Serial display data & eprom (D-IN)	5 VDC digital
2	Serial display data (LOAD)	5 VDC digital
3	Serial display data (CLK)	5 VDC digital
4	2T/4T pushbutton (0V when button pushed)	0VDC
5	Serial display eprom (D-OUT)	5 VDC digital
6	Stick mode (used for remote / local)	
7	Chip select	5 VDC digital
8	MODE pushbutton (0V when button pushed)	0VDC
9	15VDC	15 VDC
10	Remote / Local switch	
11	Inductance pot terminal 2	
12	Volts setpoint	0 – 5 VDC
13	Inductance pot terminal 1	
14	Amps setpoint	0 – 5 VDC
15	5VDC	5 VDC
16	0V	0 VDC

Table 5-29 J12 Header pin function (connects to MB header on control PCB)

R-G Header Pin	Pin function	Signal
1	Spool gun motor negative	24 VDC
2	+24V trigger positive (0V when trigger closed)	24 VDC
3	0VDC	0 VDC
4	Spool gun motor	0 VDC
5	-12VDC	-12 VDC
6	+12VDC	+12 VDC
7	Remote amps	-12 to +12 VDC
8	Remote volts	-12 to +12 VDC

Table 5-30 R-G Header pin function (connects to front panel 8 pin remote socket)

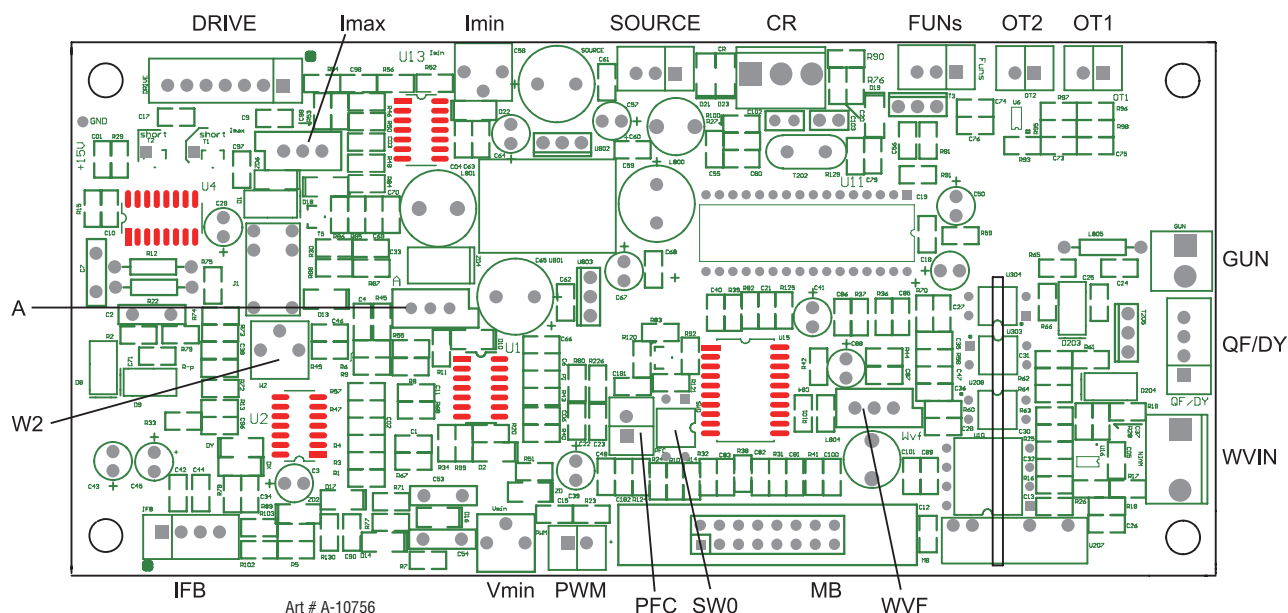
SGM Header Pin	Pin function	Signal
1	Motor negative	0 VDC
2	Motor positive	24 VDC

Table 5-31 SGM Header pin function (connects to SGM header on spoolgun PCB)

15V Header Pin	Pin function	Signal
1	0VDC	0VDC
2	15VDC	15 VDC

Table 5-32 15V Header pin function (connects to 15V header on spoolgun PCB)

## 4 Control PCB



GUN Header Pin	Pin function	Signal
1	+24V trigger positive (0V when trigger closed)	24 VDC
2	0VDC	0 VDC

Table 5-33 GUN Header pin function (connects to GUN header on display PCB)

PWM Header Pin	Pin function	Signal
1	0VDC	0 VDC
2	Motor pwm drive signal	5 VDC pk

Table 5-34 PWM Header pin function (connects to PWM header on power PCB)

PFC Header Pin	Pin function	Signal
1	5V	+5 VDC
2	PFC OK signal, 1= PFC OK	

Table 5-35 PFC Header pin function (connects to JC header on Power PCB)

QF/DY Header Pin	Pin function	Signal
1	+24V (VRD positive)	24 VDC
2	Solenoid negative	0 VDC
3	+24V (solenoid positive)	24 VDC
4	0V	0 VDC

Table 5-36 QF/FJ Header pin function (Connects to QF/FJ header on Power PCB)

FUNs Header Pin	Pin function	Signal
1	24VDC	+24 VDC
2		
3	Fan control signal, 0V = Fan ON	

Table 5-37 FUNs Header pin function (not used)

DRIVE Header Pin	Pin function	Signal
1	+15V	15 VDC
2	IGBT 1 pwm drive signal, 15V p-p square wave	15 VDC pk
3	IGBT 2 pwm drive signal, 15V p-p square wave	15 VDC pk
4	IGBT 2 pwm drive signal, 15V p-p square wave	15 VDC pk
5	IGBT 1 pwm drive signal, 15V p-p square wave	15 VDC pk
6	Rectified secondary of current transformer TR8	15 VDC pk
7	0V	0 VDC

Table 5-38 DRIVE Header pin function (connects to IN header on Power PCB)

WVIN Header Pin	Pin function	Signal
1	Positive welding terminal	positive VDC
2	No connection	n/c
3	Negative welding terminal	0 VDC

Table 5-39 WVIN Header pin function

IFB Header Pin	Pin function	Signal
1	+15V	15 VDC
2	-15V	-15 VDC
3	Current sensor signal	
4	0V	0 VDC

Table 5-40 IFB Header pin function (Connects to welding output current sensor)

SOURCE Header Pin	Pin function	Signal
1	+24V	24 VDC
2	0V	0 VDC
3	-24V	-24 VDC

Table 5-41 SOURCE Header pin function (connects to DY2 header on control PCB)

CR Header Pin	Pin function	Signal
1	+5V	5 VDC
2	Wiper 10k Burnback potentiometer	0 – 5 VDC
3	0V	0 VDC

Table 5-42 CR Header pin function (connects to 10k Burnback potentiometer)

OT1 Header Pin	Pin function	Signal
1	Diode thermostat	
2	Diode thermostat	

Table 5-43 OT1 Header pin function (connects to igbt thermostat)

OT2 Header Pin	Pin function	Signal
1	Igbt thermostat (0VDC when thermostat closed)	
2	0V	0 VDC

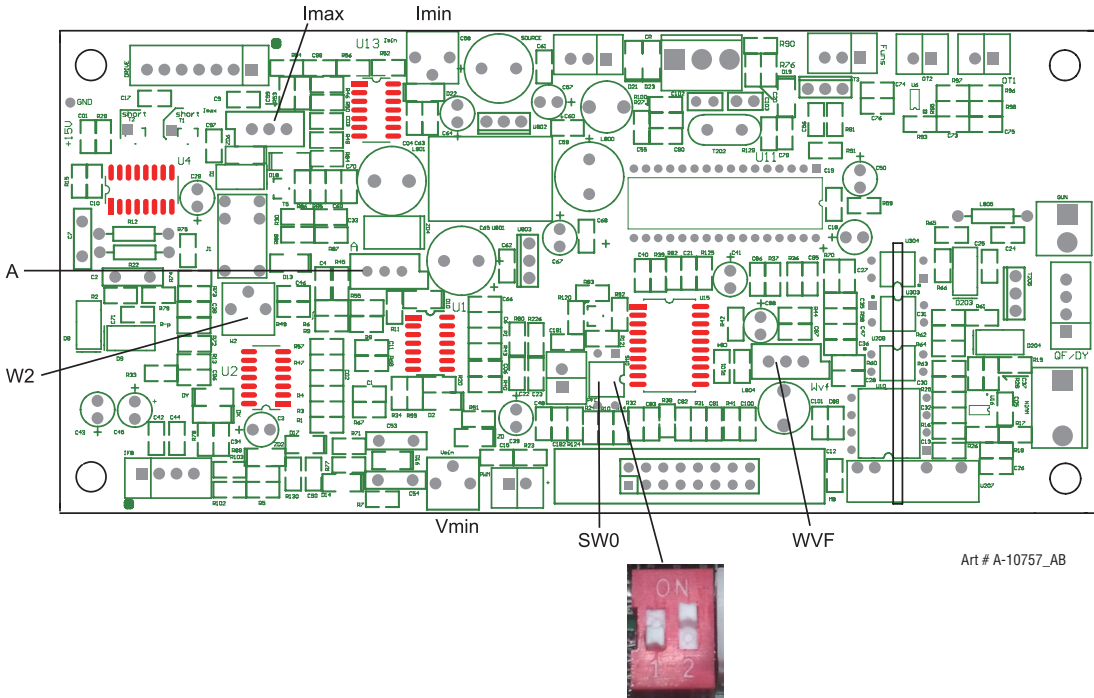
Table 5-44 OT2 Header pin function (connects to NTCS header on Power PCB)

MB Header Pin	Pin function	Signal
1	Serial display data & eprom (D-IN)	5 VDC digital
2	Serial display data (LOAD)	5 VDC digital
3	Serial display data (CLK)	5 VDC digital
4	2T/4T pushbutton (0V when button pushed)	0VDC
5	Serial display eprom (D-OUT)	5 VDC digital
6	Stick mode (used for remote / local)	
7	Chip select	5 VDC digital
8	MODE pushbutton (0V when button pushed)	0VDC
9	15VDC	15 VDC
10	Remote / Local switch	
11	Inductance pot terminal 2	
12	Volts setpoint	0 – 5 VDC
13	Inductance pot terminal 1	
14	Amps setpoint	0 – 5 VDC
15	5VDC	5 VDC
16	0V	0 VDC

Table 5-45 MB Header pin function (connects to J12 header on display PCB)

5.11 DIP Switch Settings, Control PCB

1 DIP Switch SW0, control PCB

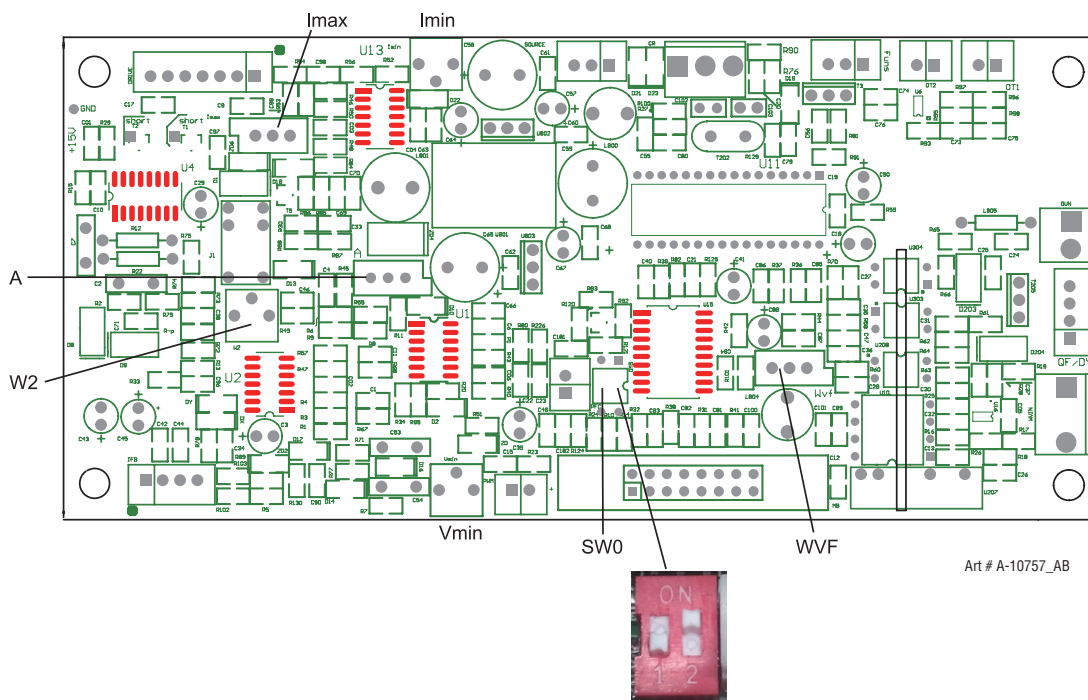


SWO No.	SWO Position
1	Set to OFF for Fabricator 211i
2	Set to ON for Fabricator 211i

Table 5-46 SW0 Dip Switch Position

## 5.12 Calibration

## 1 Calibration



Set SW0 position 1 to ON while the power source is turned off, to allow calibration of output volts & amps.

## 2 Output Current Calibration

Select STICK mode on the front panel.

Measure no load output welding voltage and adjust WVF potentiometer so Volts display reads within 0.2V of the measured value.

Connect a load to the output terminals. The load should be of a resistance to give 25V at 250A.

Set front panel AMPS potentiometer to minimum.

Adjust Imin trimpot until output amps is 10A +/- 0.2A

Set front panel AMPS potentiometer to maximum.

Adjust Imax trimpot until output amps is 200A +/- 1A

Recheck settings

Set front panel AMPS potentiometer to maximum.

Adjust A potentiometer so Amps display reads within 0.5A of the measured value.

## 3 Output Voltage Calibration

Select MIG mode on the front panel.

Remove the load from the output terminals.

Set front panel VOLTS potentiometer to minimum.

Adjust Vmin trimpot until output volts is 14.0V +/- 0.2V

Set front panel VOLTS potentiometer to maximum.

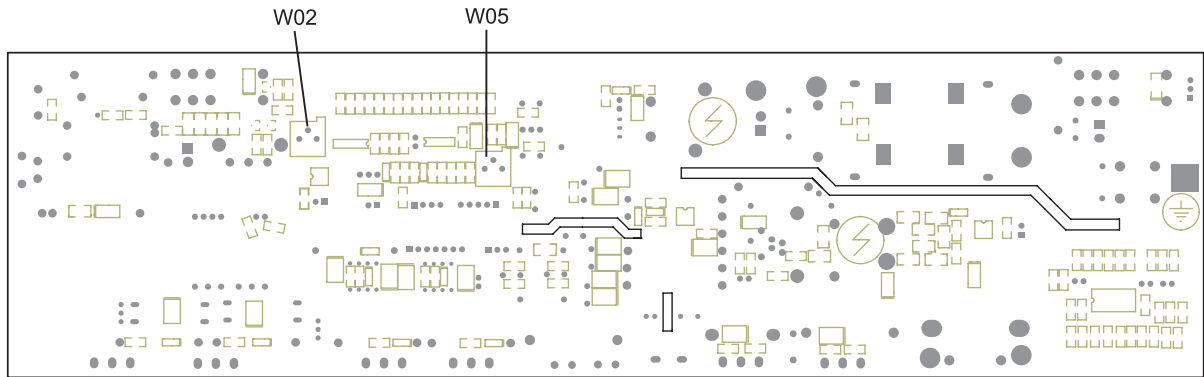
Adjust W2 trimpot until output volts is 26V +/- 0.2V

Recheck settings



#### 4 Wire Speed Calibration

NOTE: these adjustments are on the wiring side of the main Power module circuit board.



Art # A-10758

Select MIG mode on the front panel.

Remove the load from the output terminals.

Set MIG output voltage to maximum.

Set front panel WIRESPEED (AMPS) potentiometer to minimum. AMPS display should read “30”

Adjust W02 trimpot until motor volts are 4.2V +/- 0.2V or motor feedroll shaft speed is 27rpm

Set front panel WIRESPEED (AMPS) potentiometer to maximum. AMPS display should read “218”

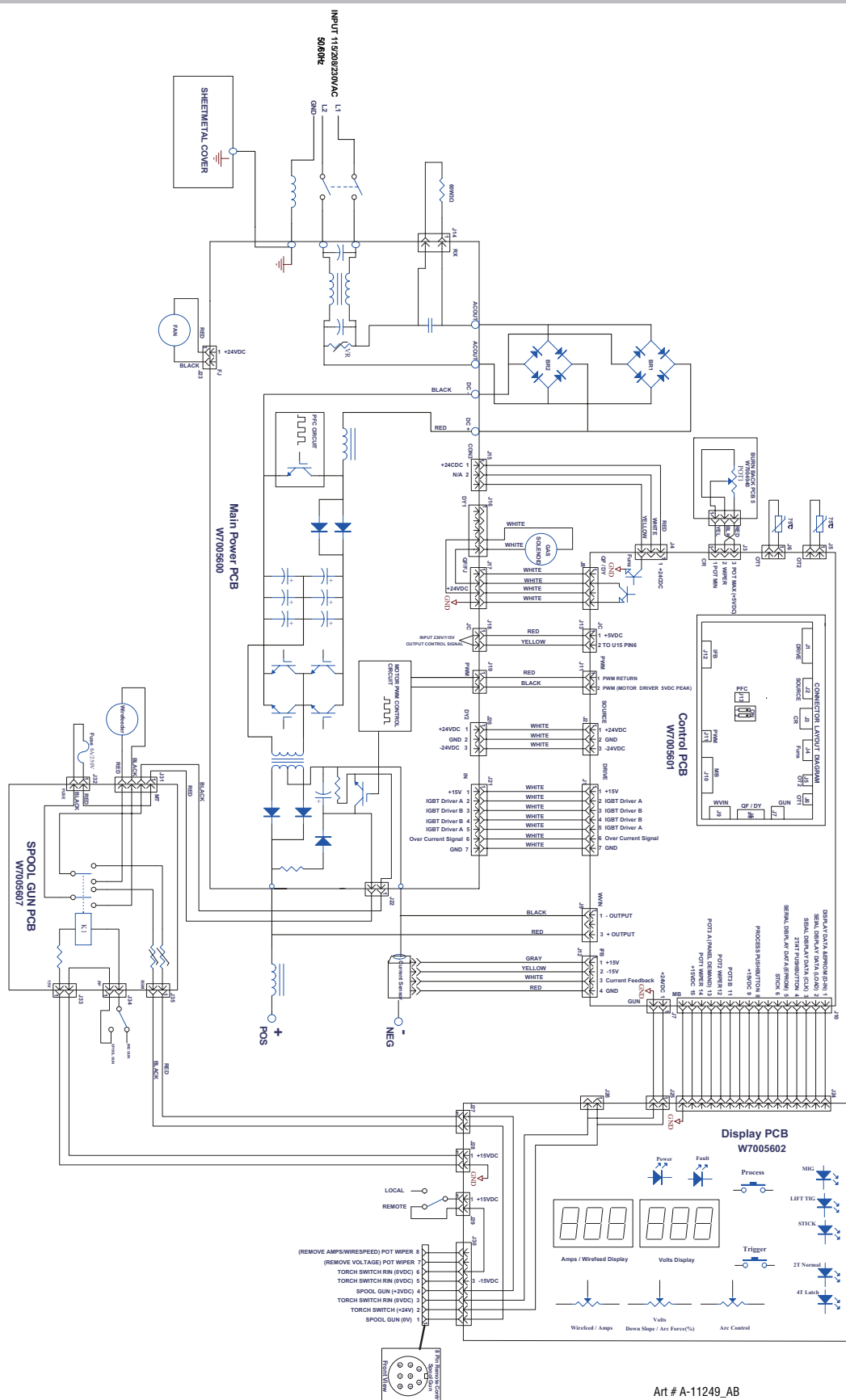
Adjust W05 trimpot until motor volts are 24.7V +/- 0.2V or motor feedroll shaft speed is 191rpm

Recheck settings

Turn Mains power off & allow power supplies to discharge

Set SW0 position 1 to OFF while the power source is turned off, to resume normal power source operation.

## Manual 0-5158



## 5.14 Main Circuit Description



Turn off power and disconnect mains supply plug from receptacle before working on the unit. Allow two minutes for capacitors to discharge after disconnection from mains supply voltage.

The mains supply voltage is connected via a double pole switch to the input rectifier Q1 through an EMC filter. Overvoltage protection is provided by varistor CY1.

The rectifier output charges the main capacitor bank (C16, C17, C18, C19, C22 and C23) to high voltage. Inrush current limiting is provided by a PTC which is then bypassed by relay J1 after a few seconds.

The primary igbt transistors (T1, T2, T4, and T5) switch the transformer primary at high frequency and varying duty cycle. The transformer return wire is taken from the junction of the capacitors C20 and C21 (the voltage at this point is approximately half the DC bus voltage).

Secondary output voltage from the transformer is rectified by the output diodes (T13, T14, T15, T16, T17, T18, T19, and T20) to DC. This DC is controlled by the PWM of the primary side igbt transistors, and is filtered by an inductor before connecting to the welding output terminals.

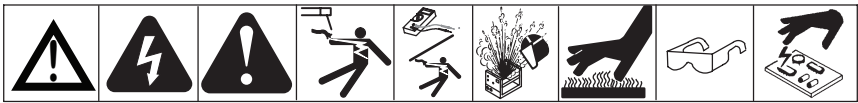
A thermal overload device (thermistor) is fixed to the rectifier heatsink. When an over temperature occurs, the control circuit inhibits the trigger, gas solenoid, wire drive system and the welding output. The thermal overload indicator LED on the front panel is illuminated.

The current transformer TR8 provides a signal to the control circuit to indicate both transformer primary current, and also detect transformer saturation. The Hall effect current sensor is powered from regulated + & - 15VDC supplies and provides a voltage signal proportional to the output DC welding current to allow the control circuit to regulate welding current.

## This image shows a full page of blank, lined paper. It features approximately 28 horizontal grey lines spaced evenly apart, typical of standard notebook paper. The lines extend across the entire width of the page, leaving small margins at the top and bottom. There are no vertical lines, text, or other markings present.

SECTION 6:  
DISASSEMBLY PROCEDURE

6.01 Safety Precautions for Disassembly



Read and follow safety information in Section 5.03 before proceeding.  
Unplug unit before beginning Disassembly procedure.

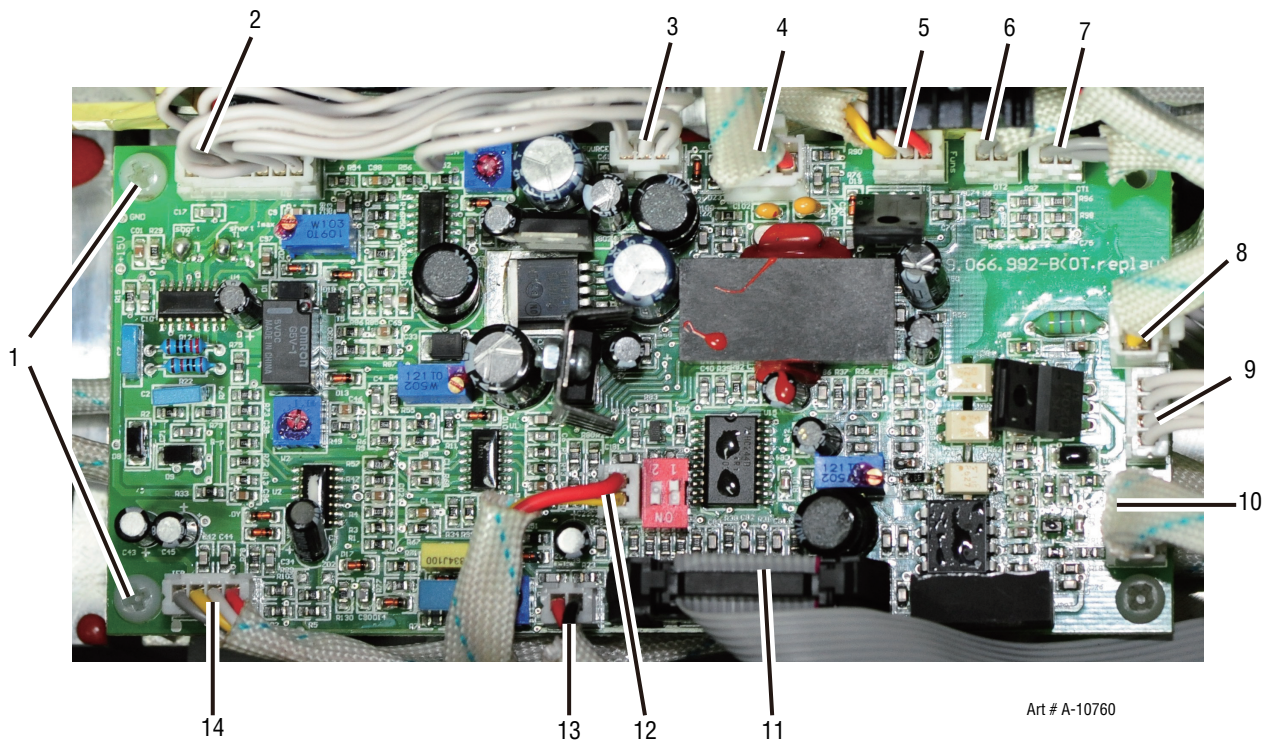
## 6.02 Control PCB Removal



Read and follow safety information in Section 5.03 before proceeding with disassembly.

Remove cover panel before remove the control PCB.

1. M4 Screw. Remove 4 screws from Control PCB.
2. Disconnect DRIVE harness from DRIVE connector.
3. Disconnect SOURCE harness from SOURCE connector.
4. Disconnect CR harness from CR connector.
5. Disconnect FUNs harness from FUNs connector.
6. Disconnect IGBT OT2 harness from IGBT OT2 connector.
7. Disconnect IGBT OT1 harness from IGBT OT1 connector.
8. Disconnect GUN harness from GUN connector.
9. Disconnect QF/DY harness from QF/DY connector.
10. Disconnect WVIN harness from WVIN connector.
11. Disconnect MB harness from MB connector.
12. Disconnect JC harness from JC connector.
13. Disconnect PWM harness from PWM connector.
14. Disconnect IFB harness from IFB connector.

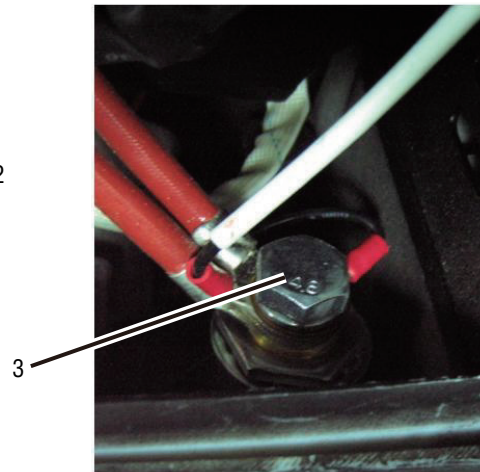
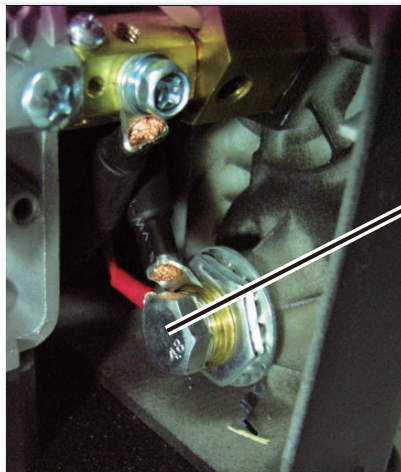


Art # A-10760

**6.03 Front Panel Assembly Removal**

Read and follow safety information in Section 5.03 before proceeding with disassembly

1. Screws on front panel.
2. Positive output terminal bolts. Unscrew output terminal bolts.
3. Negative output terminal bolts. Unscrew Negative output terminal bolts.



Art # A-11351

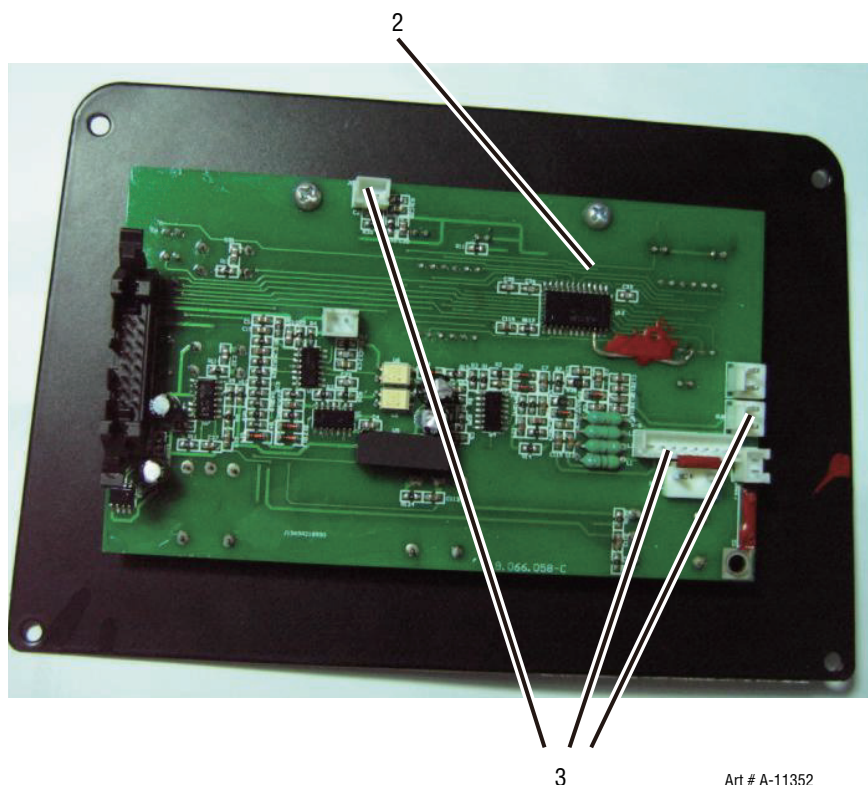


## 6.04 Display PCB Removal



Read and follow safety information in Section 5.03 before proceeding with disassembly.

1. Remove Control Panel screw (4).
2. Display PCB.
3. Disconnect the harnesses from the connectors.



## 6.05 Back Panel Removal

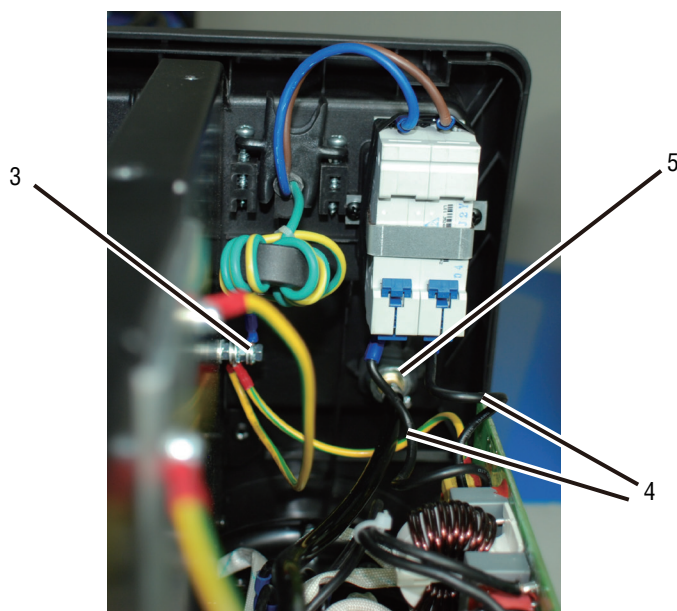
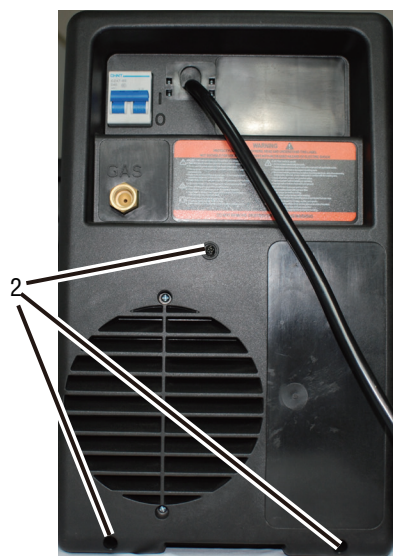


Read and follow safety information in Section 5.03 before proceeding with disassembly.

1. Remove the screws on the back .
2. Remove Rear Panel screws .
3. Remove The Ground Wire.
4. Wire from Power PCB.

Disconnect the two wires from switch.

5. Remove The Screw and Disconnect the pipe from gas inlet.



Art # A-11353

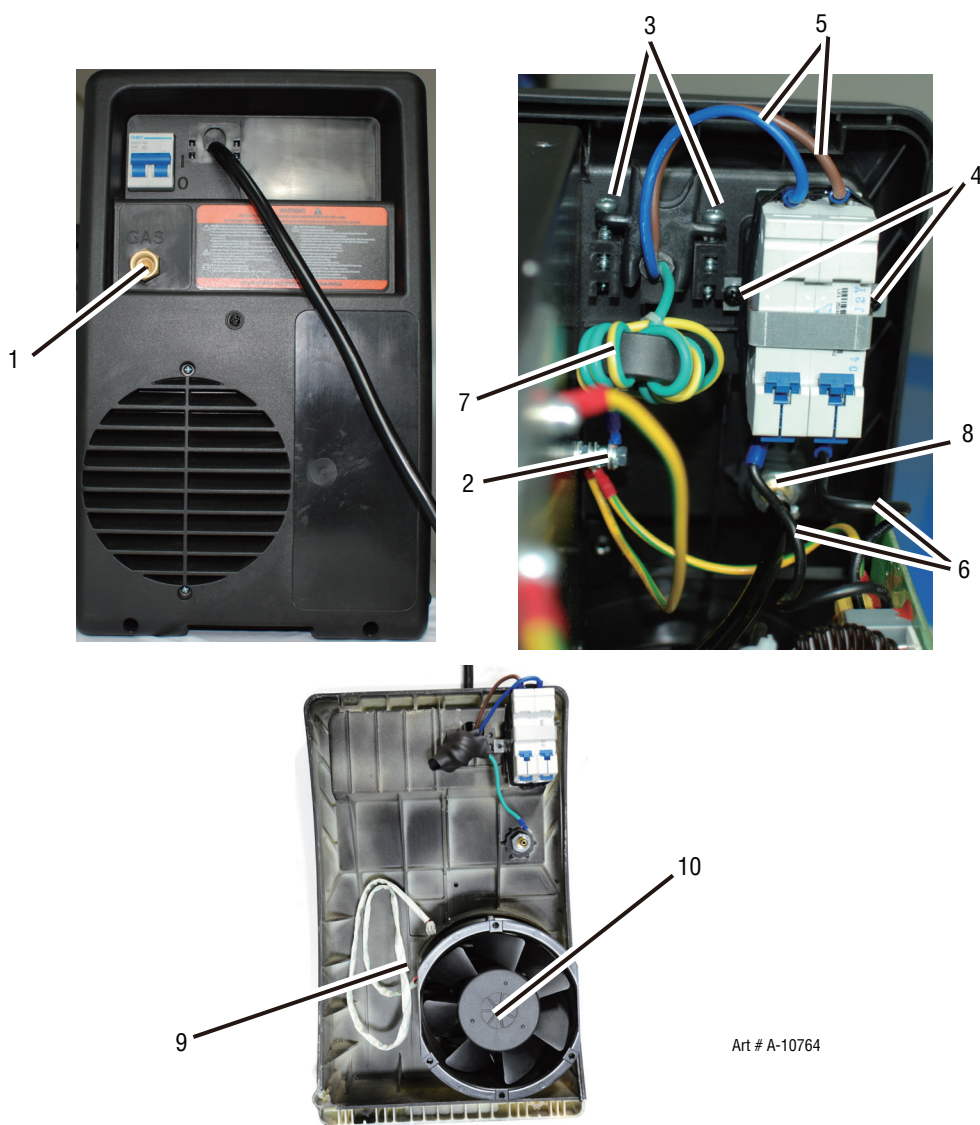
**6.06 Power Switch S1 and Power Cord Removal**

Read and follow safety information in Section 5.03 before proceeding with disassembly.

1. Gas inlet. Remove gas inlet from rear panel.
2. Remove The Ground Wire.
3. Remove the screws which control the supply cord.
4. Remove the two screws and push SW1 out from the rear panel.
5. Remove the two supply wires from the switch.
6. Remove the supply wires which connect to power PCB.
7. Input Power Cord ground wire filter.

Cut the tie-wrap and remove the Ferrite core from the ground wire.

8. Remove The Screw and Disconnect the pipe from gas inlet.
9. Disconnect harness from power PCB.
10. Remove Fan.



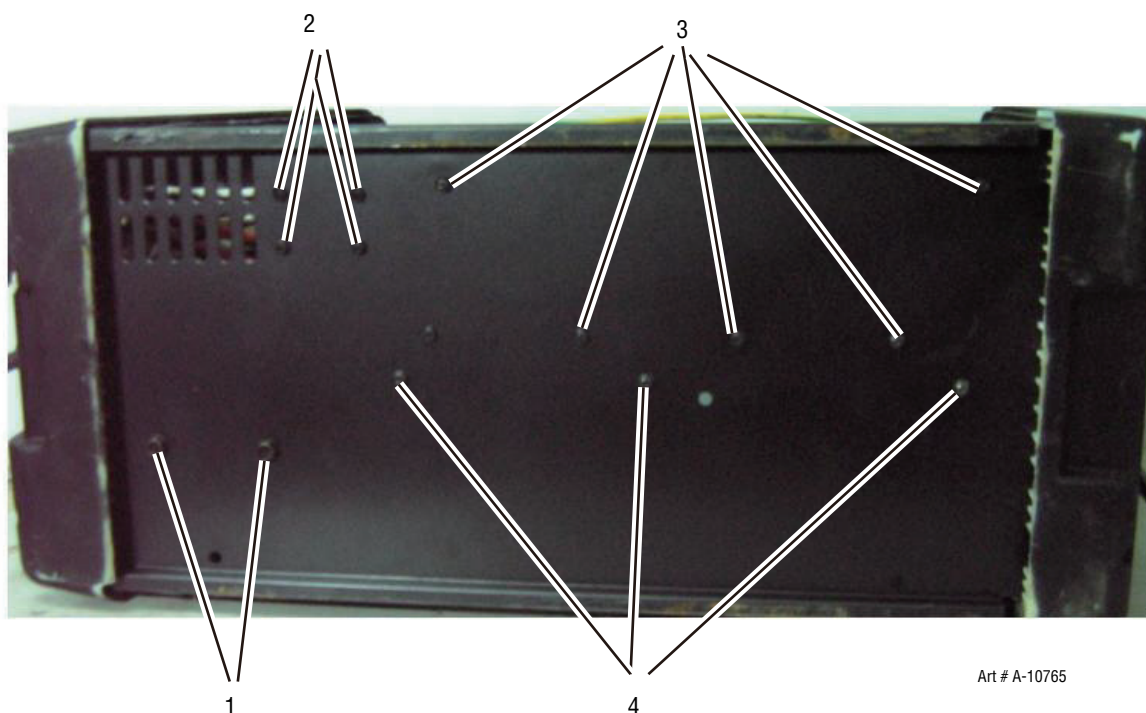
Art # A-10764



**6.07 Base Panel Removal**

Read and follow safety information in Section 5.03 before proceeding with disassembly.

1. Remove Wire Feeder Screws.
2. Remove inductor assembly Screws.
3. Remove Power PCB assembly Screws.
4. Remove Center Panel Screws.



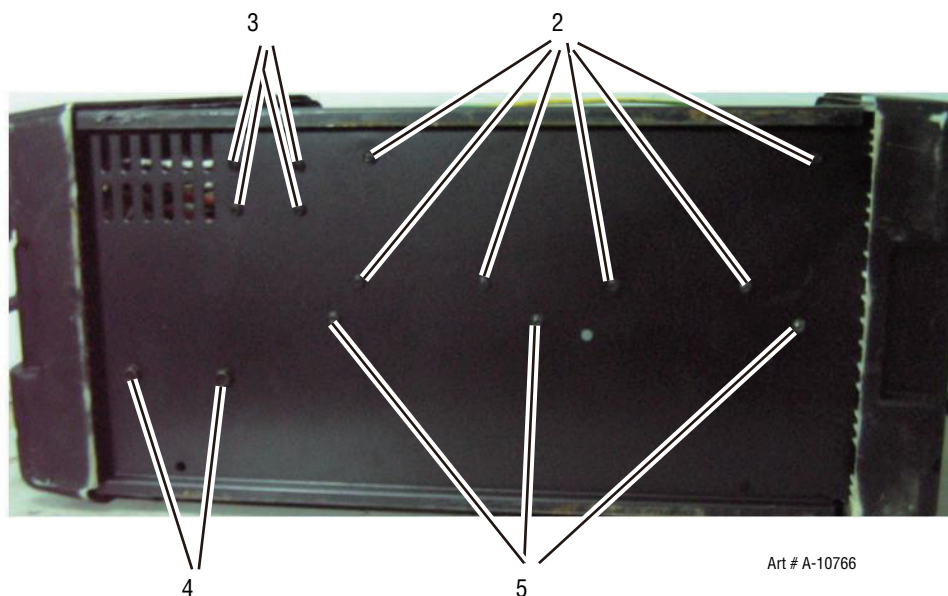
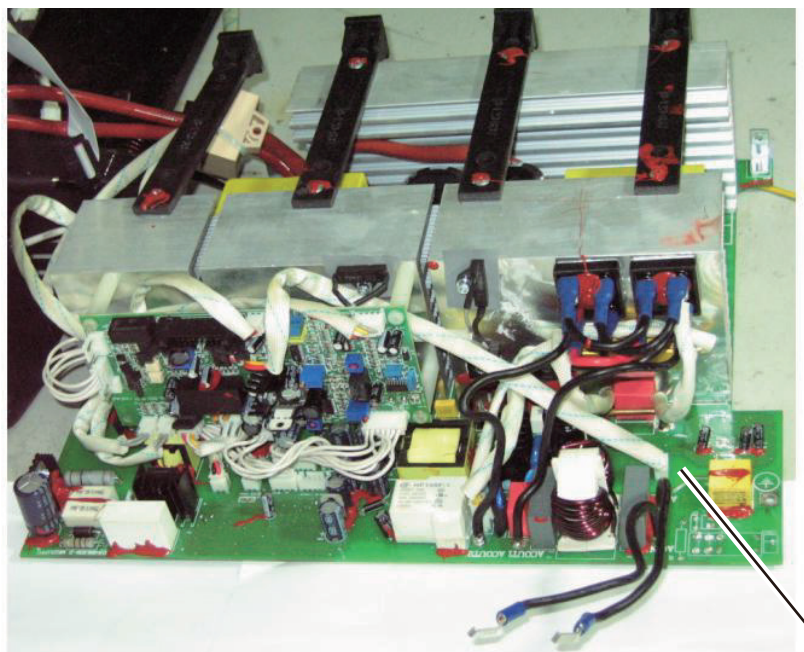
## Notes

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## SECTION 7: ASSEMBLY PROCEDURES

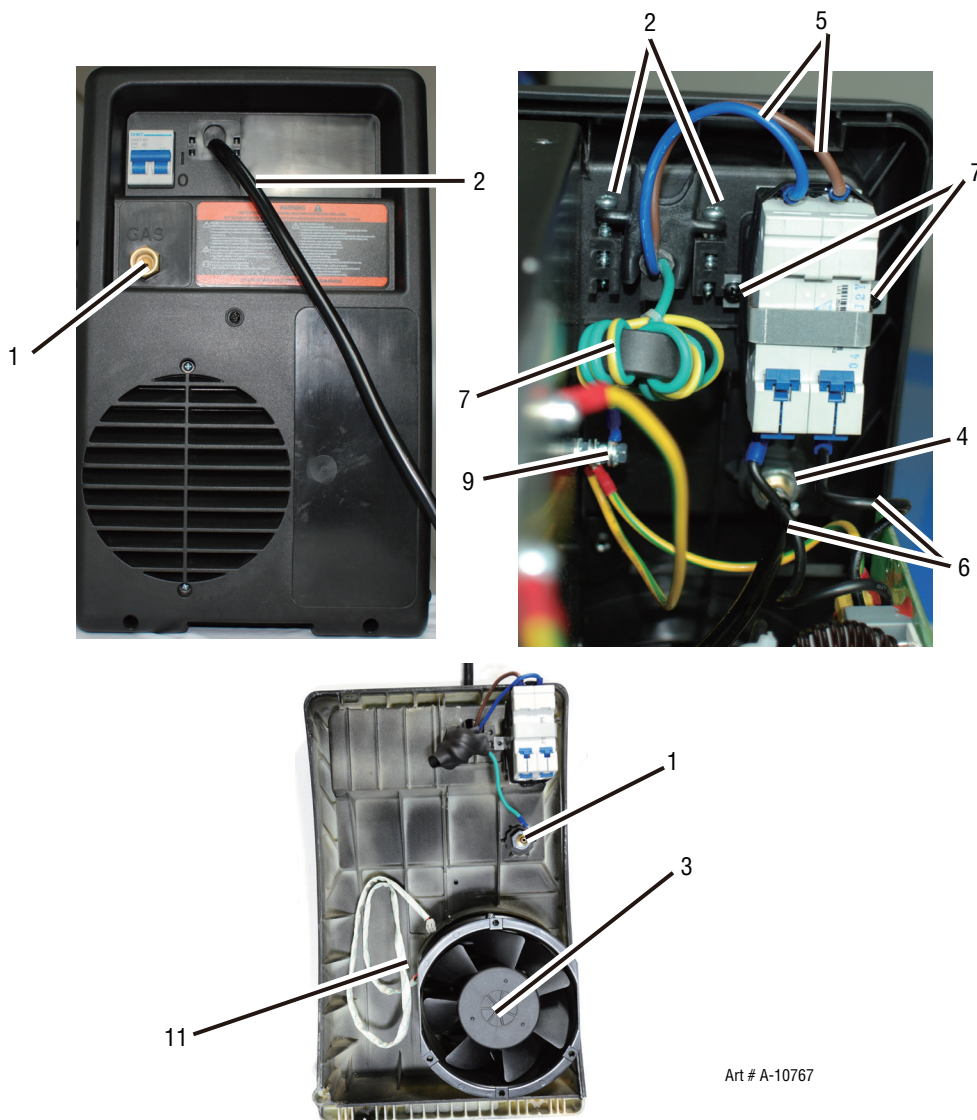
### 7.01 Installing Base Panel

1. Power PCB assembly.
2. Install Power PCB assembly screws.
3. Install inductor assembly Screws.
4. Install Wire Feeder Screws.
5. Install Center Panel Screws.



**7.02 Installing Back Panel**

1. Install gas inlet.
2. Install the power supply cord and the screws.
3. Install fan.
4. Reconnect the pipe to gas inlet and the screw.
5. Reconnect the supply wires.
6. Reconnect the supply wires which connect to power PCB.
7. Install the two screws
8. Reinstall magnetic core onto Ground Wire.
9. Reconnect Ground Wire to the terminal.
10. Reconnect Rear Panel screws.
11. Reconnect the harness to FAN connector.



Art # A-10767



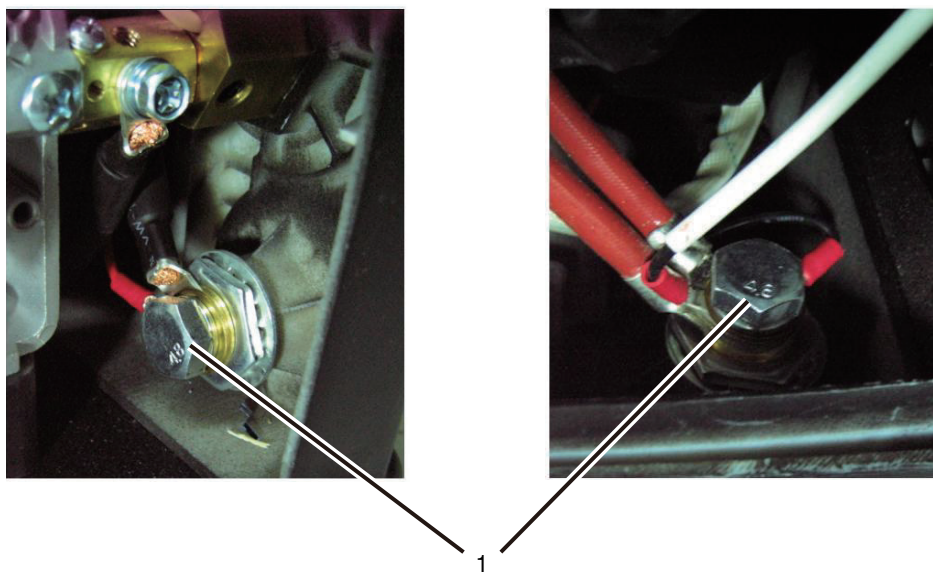
## 7.03 Installing Front Panel

1. Reinstall output Dinse on front panel with 27mm wrench.

Reconnect positive output terminal bolts and tighten with 17mm wrench. ( Note: reconnect wires, pay attention to the wire colour.)

Reconnect negative output terminal bolts and tighten with 17mm wrench. (note: reconnect wires and pay attention to the wire colour.)

2. Place display PCB and control panel assembly into front panel. Install screws.
3. Reconnect Front Panel screws.



Art # A-11354

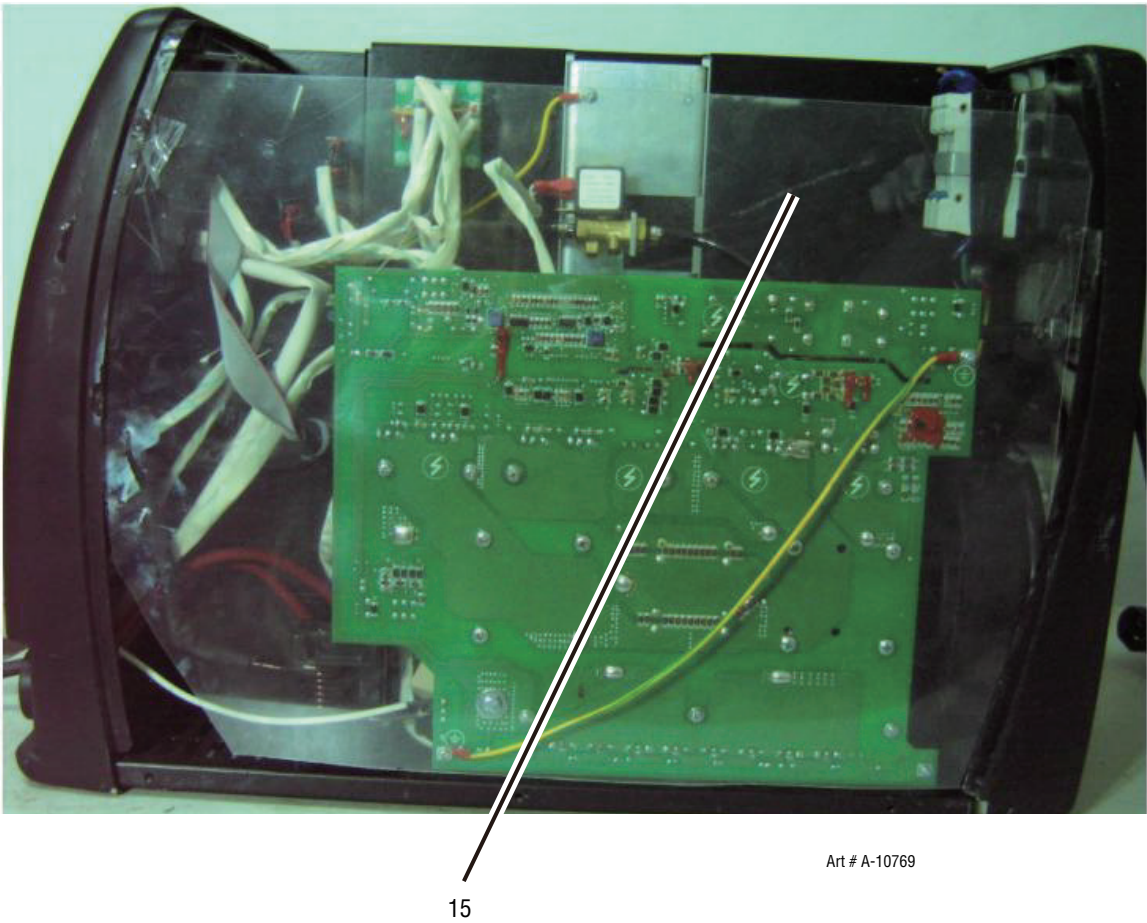
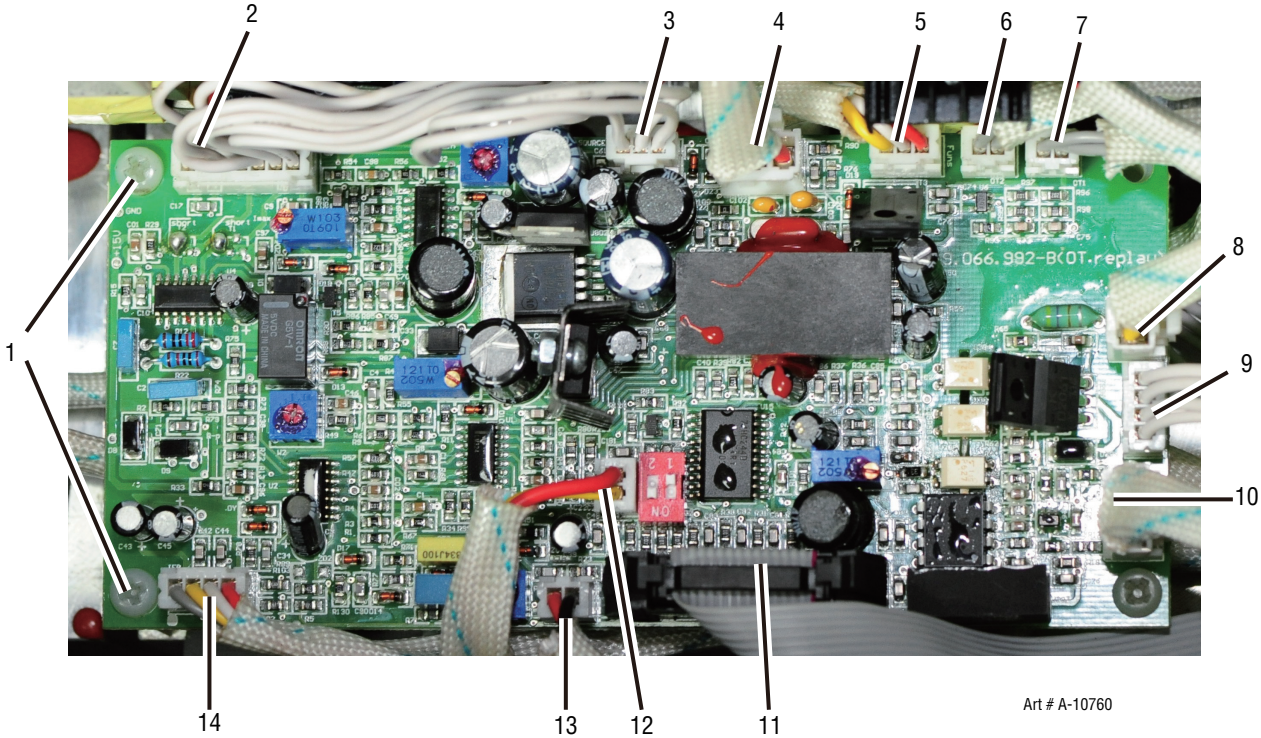
**7.04 Installing Control PCB and Clear Cover Sheet**

Refer to diagram on page 7-5.

1. Install 4 screws.
2. Plug harness into DRIVE connector.
3. Plug harness into SOURCE connector.
4. Plug harness into CR connector.
5. Plug harness into FUNs connector.
6. Plug harness into m IGBT OT2 connector.
7. Plug harness into IGBT OT1 connector.
8. Plug harness into GUN connector.
9. Plug harness into QF/DY connector.
10. Plug harness into WVIN connector.
11. Plug harness into MB connector.
12. Plug harness into JC connector.
13. Plug harness into PWM connector.
14. Plug harness into IFB connector.

Verify harness connections with the system schematic to insure all connections are correct.

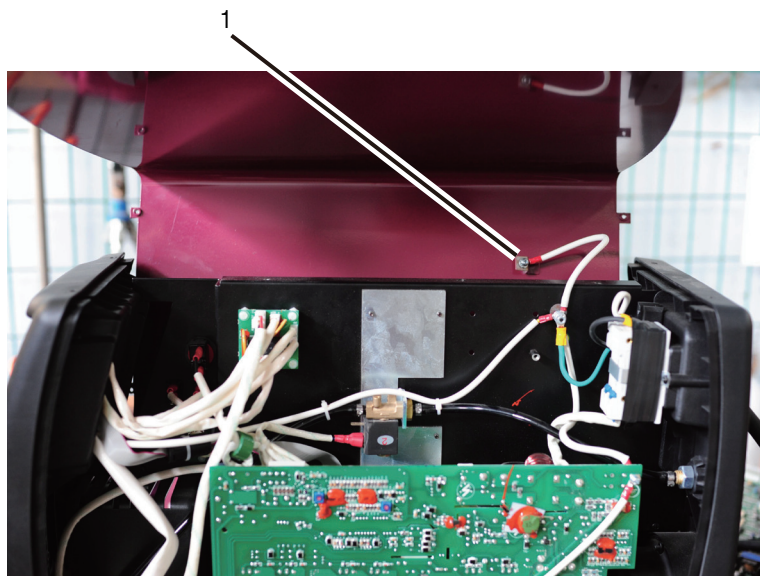
15. Install clear protective sheet.





**7.05 Installing Cover Panel and Door Panel**

1. Install Ground Screw, which connects the ground wire to the cover.
2. Install cover panel and door panel. Install Screws. Tighten screws.



Art # A-11363\_AB



SECTION 8:  
KEY SPARE PARTS

8.01 Tweco Weldskill 220A MIG Gun (Used until January, 2013)

MIG Gun Part No: WS220TA-15-3035

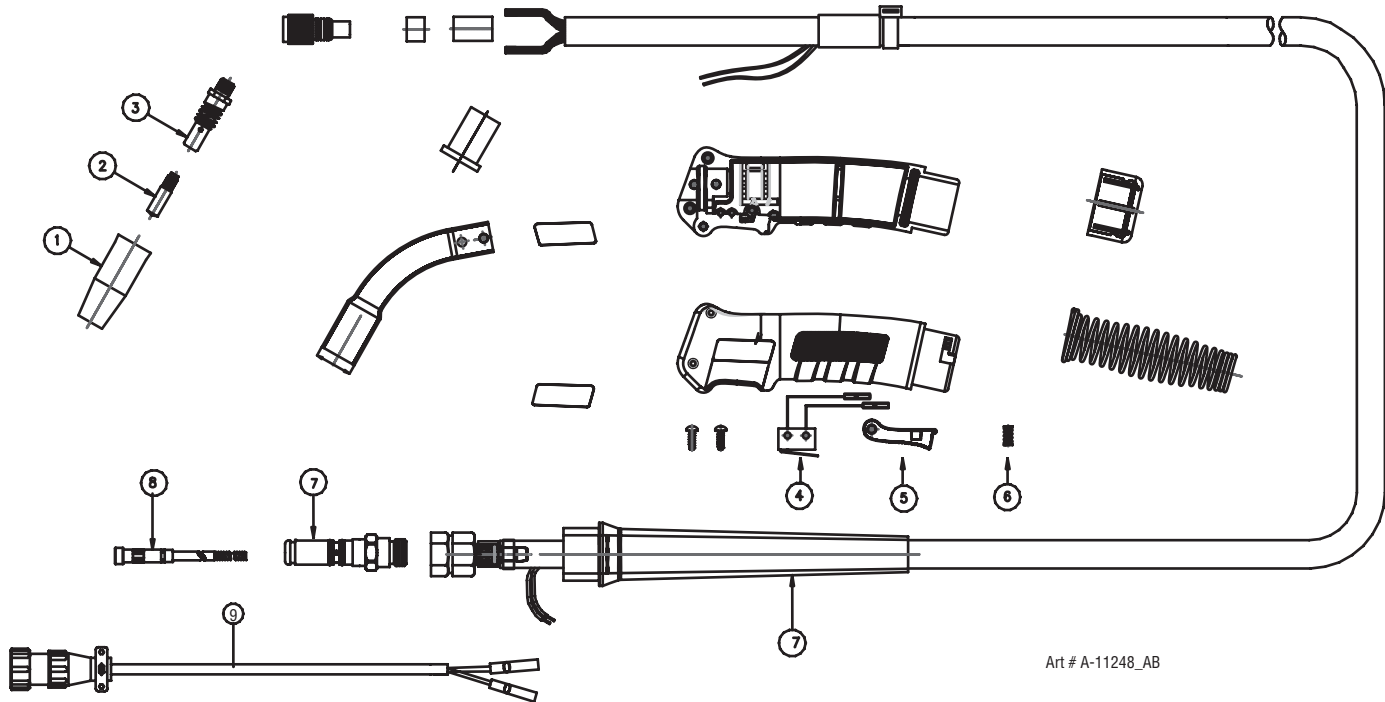


Figure 8-1: Tweco WeldSkill 220 MIG Gun

TWECO WELDSKILL 220A MIG GUN PARTS		
ITEM	PART NO.	DESCRIPTION
1	1210-1112	Nozzle 1/2" - 12.7 mm Flush
2	1110-1102	Contact Tip .035" - 0.9mm
3	1510-1140	Gas Diffuser
4	2042-2053	Microswitch
5	2042-2054	Trigger Lever
6	2042-2055	Trigger Lever Spring
7	2035-12110	Tweco Rear Connector Plug
8	1420-1140	Conduit Assembly .030" to .035" - 0.8mm to 0.9mm
9	WS-354-TA-LC	8- Pin Control Wire

Table 8-1: Tweco WeldSkill 220 MIG Gun Parts

8.02 Tweco Fusion 220A MIG Gun

Torch Part No: F220TA-12-3035

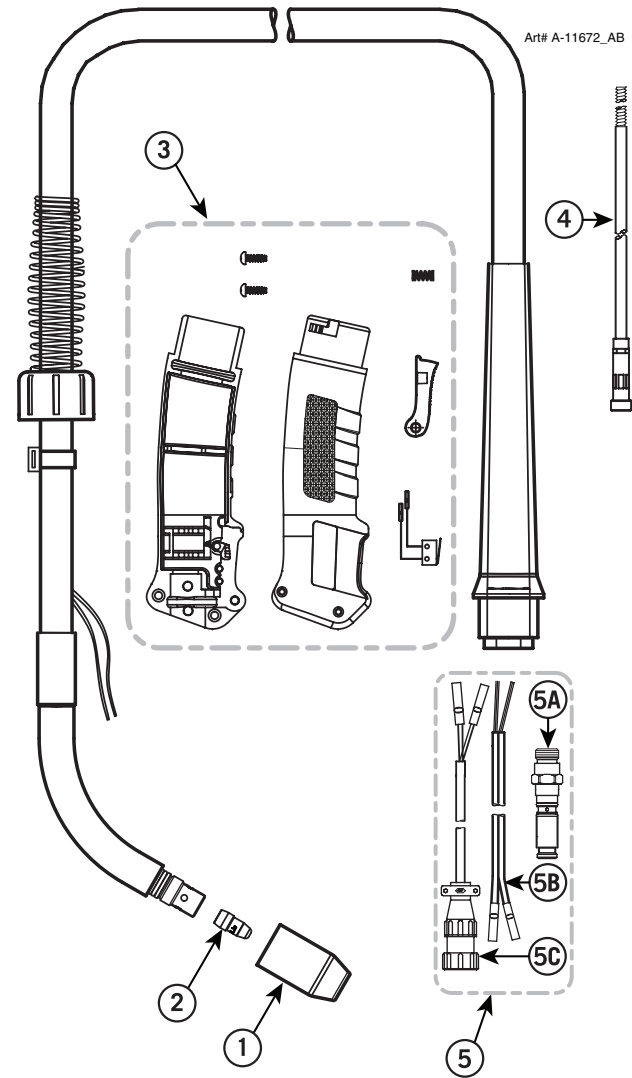


Figure 8-2

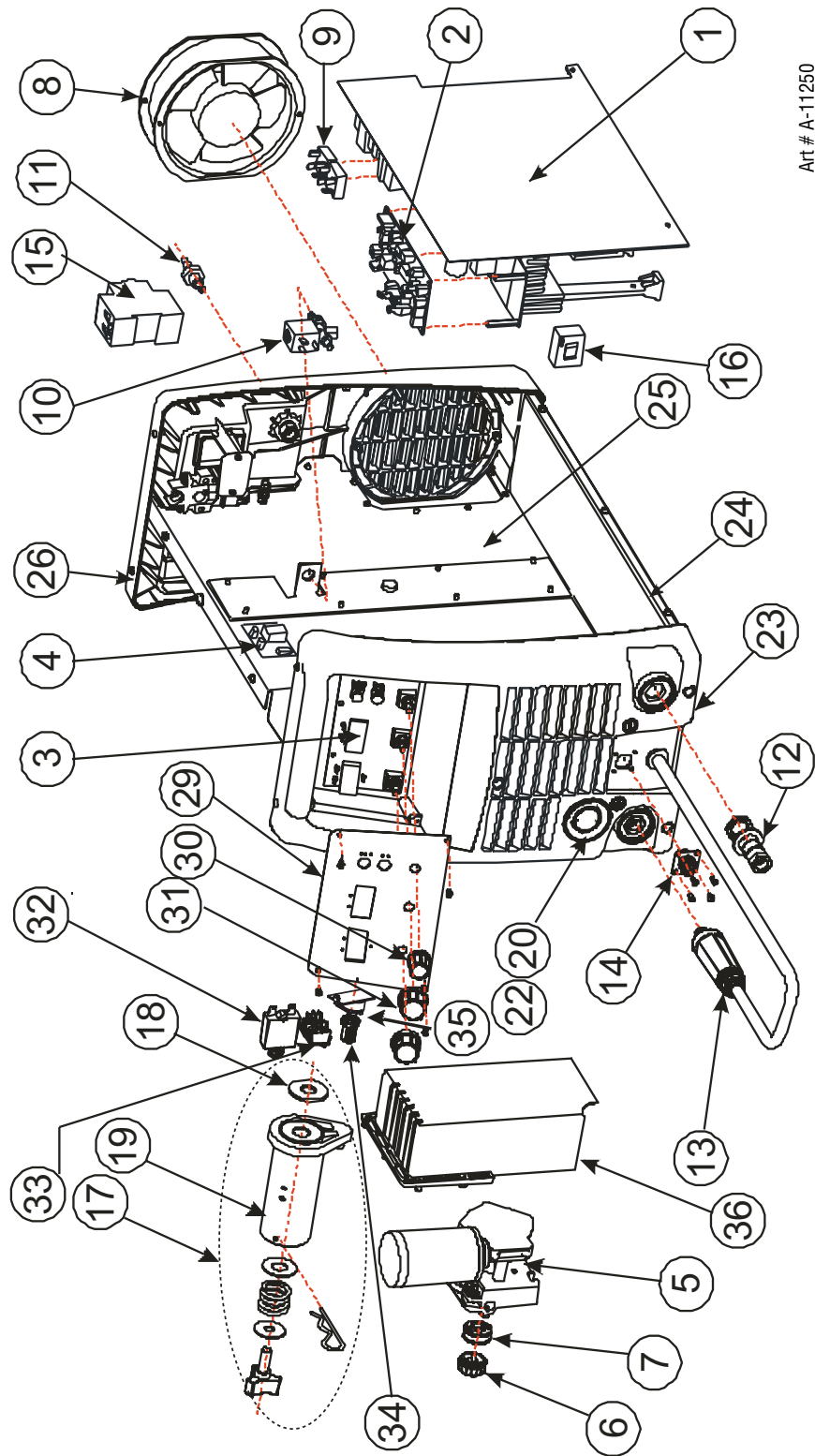
Item No.	Description	Part No.
1	Velocity Nozzle**	VNS-50
		VNS-50F
		VNS-62
		VNS-62F
		VNS-37
		VNS-37F
		VNS-75FAS
2	Velocity Contact Tip**	VTS-23
		VTS-30
		VTS-35
		VTS-40
		VTS-45
		VTS-364
		VTSA-364
		VTS-52
		VTS-116
		VTSA-116
		VTS-564
3	Handle / Trigger Repair Kit	F80
4	Conduit Assembly*	WS42-3035-15
5	5A Tweco Rear Connector	350-174H
	5B Tweco Control Wire & Plug	35K-350-1
	5C Thermal Arc Control Wire	WS-354-TA-LC

Table 8-2: Tweco Fusion 220A MIG Gun Parts

\*\* Patent Pending

\* Refer to Tweco Catalog No. 64-2103 for additional options.

8.03 Power Source Spare Parts



Art # A-11250

Figure 8-3



Item	Part Number	Description
1	W7005621	PCB Power, Fab 211i
2	W7005601	PCB Control, Fab 211i
3	W7005602	PCB Display, Fab 211i
4	W7005607	PCB Spool Gun, Fab 211i
5	W7005603	Wiredrive Assembly, Fab 211i
6	W7004906	Thumbscrew, Feedroll Positioner
7	W4014800	DRIVE RL2 Roll, .023/.035 "V"
8	W7005622	Fan Assembly, Fab 211i UL/CSA
9	W7003010	Rectifier Bridge, 1000V, 50A
10	W7003033	Gas Solenoid Valve Assy
11	W7003215	Gas Inlet Fitting
12	W7004909	Connector Socket, 50 Dinse
13	W7004955	Connector Plug, 50 Dinse
14	W7003242	Socket, 8 Pin, w/ Harness
15	W7005623	Switch CB, Main On-Off
16	W7004911	CT, Output
17	W7005617	Spool Hub Assembly
18	W7005608	Washer, Friction, Spool Hub
19	W7005609	Spool Hub
20	W7004966	Adapter, Tweco 4, 141i-211i
21	W7005619	Guide, Inlet, .023-.045 (not shown)
22	W7004967	Guide, Outlet, .023-.045
23	W7005624	Front, Panel, Fab 211i UL/CSA
24	W7005610	Panel, Base, Fab 211i
25	W7005625	Center Panel, Fab 211i
26	W7005626	Rear, Panel, Fab 211i UL/CSA
27	W7005631	Panel, Cover, Fab 211i (not shown)
28	W7005627	Panel, Door, Fab 211i (not shown)
29	W7005628	Panel, Control, Fab 211i
30	W7004972	Knob, 1/4" IDx1" ODx0.9" H
31	W7005630	Knob, 1/4" IDx1.25" ODx.9" H
32	W7005629	Circuit Breaker, 4A
33	W7004943	Switch, 250V/2A
34	870734	Knob, 1/4" IDx.72" ODx.9" H
35	W7004940	PCB, Burnback Potentiometer
36	W7005632	Shroud, WF Motor, 211i
37	W7005616	Label, Identification, Fab 211i (not shown)
38	W7005634	Setup Chart English Version (not shown)
39	7978044PKD	Large Spring, for One Pound Spool (not shown)
40	W7005635	Latch, door, slide (not shown)

Table 8-2: Fabricator 211i Parts

## SECTION 9: OPTIONAL ACCESSORIES

### 9.01 Optional Accessories



**26V TIG Torch & Accessories** *(required for TIG welding)*  
12.5 ft cable length; 12.5 ft gas hose length; 8 pin control  
plug; 1/16", 3/32", 1/8" thoriated tungstens; 1/16", 3/32",  
1/8" collets; 1/16", 3/32", 1/8" collet bodies; No. 5, 6, 7  
Alumina nozzle; short back cap; long back cap

Part No. **W4014603**



**Tweco Spool Gun** *(required for aluminum MIG welding.)*  
160A, 12ft (3.6M) Length, suits 4" (100mm) spools

Part No. **1027-1390**



**Professional 4 Wheel Cart, Dual Cylinder** .....

Part No. **W4015002**



**Professional 4 Wheel Cart, Single Cylinder** .....

Part No. **W4015001**



**Small Cart, Single Cylinder**.....

Part No. **W4014700**



**Roll Cage** .....

Part No. **W4015104**



**Foot Control** .....  
*For remote amperage control when TIG welding*

Part No. **600285**



**Tweco Helmet (USA Only)** .....  
*WeldSkill Auto-Darkening Helmet Skull & Fire (USA Only)*

Part No. **4100-1004**

**Drive Roll .023" - .030" (0.6/0.8mm ) V groove, (fitted)**

Part No. **7977036**

**Drive Roll .023" - .035" (0.6/0.9 mm) V groove .**

Part No. **W4014800**

**Drive Roll .035"/.045" (0.9/1.2 mm) V groove ..**

Part No. **7977660**

**Drive Roll .030" - .035" (0.8/0.9 mm) U groove..**

Part No. **7977731**

**Drive Roll .040" - 3/64" (1.0/1.2 mm) U groove .**

Part No. **7977264**

**Drive Roll .030" - .035" (0.8/0.9 mm) V knurled**

Part No. **7977732**

**Drive Roll .045"(1.2 mm) V knurled .....**

Part No. **704277**

**Stick Lead, 200A, 13ft, 50mm Dinse .....**

Part No. **WS200E13**

**Ground Lead, 200A, 10Ft, 50mm Dinse.....**

Part No. **WS200G10**

**Victor Argon Regulator/ Flowgauge** .....

Part No. **130781-4169**

**Accessory Kit for TIG Torch**.....  
1/16", 3/32", 1/8" thoriated tungstens; 1/16", 3/32",  
1/8" collets; 1/16", 3/32", 1/8" collet bodies; No. 5, 6,  
7 Alumina nozzle; short back cap; long back cap

Part No. **P062900010**

# STATEMENT OF WARRANTY

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Effective 08/01/2011

This warranty supersedes all previous  
VICTOR TECHNOLOGIES® warranties.

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**THIS WARRANTY BECOMES INVALID IF REPLACEMENT PARTS OR ACCESSORIES ARE USED WHICH MAY IMPAIR THE SAFETY OR PERFORMANCE OF ANY VICTOR TECHNOLOGIES® PRODUCT.**

**THIS WARRANTY IS INVALID IF THE PRODUCT IS SOLD BY NON-AUTHORIZED PERSONS.**

The warranty is effective for the time stated below beginning on the date that the authorized distributor delivers the products to the Purchaser. Notwithstanding the foregoing, in no event shall the warranty period extend more than the time stated plus 1 year from the date VICTOR TECHNOLOGIES® delivered the product to the authorized distributor.

# WARRANTY SCHEDULE

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5 Years Parts\* / 3 Years Labor

ArcMaster, Excelarc, Fabricator, Fabstar, PowerMaster

Portafeed, Ultrafeed, Ultima 150, WC 100B

\* 5 years on the Original Main Power Transformer and Inductors not mounted on PCBoards.

\* 3 years on Power Supply Components

2 Years Parts and Labor Unless specified

Auto-Darkening Welding Helmet (electronic Lens), \*\* 1 Month Harness Assy

Victor Regulator for Fabricator 181i (No labor)

1 Years Parts and Labor Unless specified

95S, Water recirculators

All Plasma Welding consols (i.e WC-1 Controller, WT Timer,

WF-100 Capstain Feeder, etc)

180 days parts and Labor Unless specified

Plasma Welding Torch and leads packages

Gas Regulators "Supplied with power sources" (No Labor)

90 days parts / No Labor

Remote Controls

MIG and TIG Torches (Supplied with power sources)

Replacement repair parts

30 days parts / No Labor

MIG Torch for Fabricator 181i

5-2-1 years Parts / No Labor

FirePower® Welders



5 Years Parts / No Labor

Victor® Professional

VICTOR TECHNOLOGIES limited warranty shall not apply to:

Consumable Parts for MIG, TIG, Plasma welding, Plasma cutting and Oxy fuel torches, O-rings, fuses, filters or other parts that fail due normal wear

\* Warranty repairs or replacement claims under this limited warranty must be submitted by an authorized VICTOR TECHNOLOGIES® repair facility within thirty (30) days of the repair.

\* No employee, agent, or representative of VICTOR TECHNOLOGIES® is authorized to change this warranty in any way or grant any other warranty, and VICTOR TECHNOLOGIES® shall not be bound by any such attempt. Correction of non-conformities, in the manner and time provided herein, constitutes fulfillment of VICTOR TECHNOLOGIES®'s obligations to purchaser with respect to the product.

\* This warranty is void, and seller bears no liability hereunder, if purchaser used replacement parts or accessories which, in VICTOR TECHNOLOGIES®'s sole judgment, impaired the safety or performance of any VICTOR TECHNOLOGIES® product. Purchaser's rights under this warranty are void if the product is sold to purchaser by unauthorized persons.

#### THE AMERICAS

Denton, TX USA  
U.S. Customer Care  
Ph: 1-800-426-1888 (tollfree)  
Fax: 1-800-535-0557 (tollfree)  
International Customer Care  
Ph: 1-940-381-1212  
Fax: 1-940-483-8178

Miami, FL USA  
Sales Office, Latin America  
Ph: 1-954-727-8371  
Fax: 1-954-727-8376

Oakville, Ontario, Canada  
Canada Customer Care  
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International Customer Care: 940-381-1212 / FAX 940-483-8178

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